

**DUAL NUTRITION BURDEN:  
PERSPECTIVES ,DETERMINANTS AND DIMENSIONS**

# WHAT IS DUAL NUTRITION BURDEN

Developing countries are currently undergoing economic, social, demographic, health and nutrition transitions.

The term **dual nutrition burden** was coined in the nineties of last century to denote the phase of ongoing nutrition transition in low and middle income countries, characterized by persistent under-nutrition mainly among poorer segments of population and emerging problem of over-nutrition seen mostly among the urban affluent segments.

# DIMENSIONS OF DUAL NUTRITION BURDEN

During last two decades, Indian scientists have been in the forefront of global efforts exploring epidemiological, clinical and biochemical dimensions and health implications of dual nutrition burden. These studies have:

- Defined the magnitude of dual nutrition burden in urban and rural areas in different states and among different socio-economic groups

- Shown that under-nutrition & over-nutrition can be seen in




  - same family

  - same individual at different periods of time

  - same individual at the same time

- Documented trans-generational impact of dual nutrition burden

**This presentation will review**

-  the perspective of emerging dual nutrition burden in India**
-  dimensions of dual nutrition burden**
-  determinant of dual nutrition burden**

# PERSPECTIVE

# SEVENTY YEARS AGO

When India became independent the country was not self sufficient in food grain production; 80% of Indians were poor and food insecure

Country faced two major nutritional problems:

- ✿ threat of famine and the resultant acute starvation due to low food production and the lack of an appropriate food distribution system

- ✿ Prevalence of macro & micronutrient deficiencies were high due to:

- low dietary intake because of poverty and low purchasing power;

- high prevalence of infection because of poor access to safe-drinking water, and sanitation;

- lack of health care facilities and poor utilization of available facilities due to low literacy and lack of awareness

- ✚ Famine and starvation hit the headlines because they are acute, localised, cause profound suffering and fatalities

- ✚ Chronic low food intake was a wide spread silent problem leading to under-nutrition and many more deaths than starvation

# GREEN REVOLUTION: FROM SHIP-TO-MOUTH TO SELF-SUFFICIENCY IN A DECADE

## ➤ Policy and programme interventions:

- Investment in irrigation
- Land reforms
- Fertilizer production and subsidy
- Minimum support price
- Farm level procurement

**R&D:** support for development of high yielding strains

- Lab-to-land extension education

**All these were well implemented**

**PERHAPS THIS IS A GOOD EXAMPLE OF WHAT INDIANS CAN DO  
WHEN THEY WERE DRIVEN TO A CORNER- A MISSION MODE  
PUBLIC PRIVATE PARTNERSHIP TO ACHIEVE A NATIONAL GOAL  
IN RECORD TIME**

# **NUTRITION & HEALTH STATUS OF INDIANS IN SEVENTIES**

- ☀ Over 70% of India's population were poor**
- ☀ They spent over 70% of their income on food**
- ☀ Despite this expenditure, over 70% of were undernourished**
- ☀ Access to essential health care was low**
- ☀ Morbidity and mortality rates were very high**

**Mere self-sufficiency in food grain production by itself will not improve household food security or nutritional status of individuals**

**Better access to subsidised food grains, nutrition, health and family planning services are essential**

**Access to health care for treatment of morbidity will improve nutritional status in children**



# **MULTI-PRONGED INTERVENTIONS FOR FOOD SECURITY**

**To Improve National Food security:**

- Increase food production to meet needs of population growth**
- Build buffer stocks**
- Build Public Distribution System (PDS).**

**To Improve Household Food Security:**

- Improve purchasing power: employment programme**
- Direct or indirect food subsidy.**

**To improve nutritional status of vulnerable groups:**

- Food supplementation programmes.**

**To monitor progress in these efforts to improve food security and nutrition, several independent national surveys were established.**

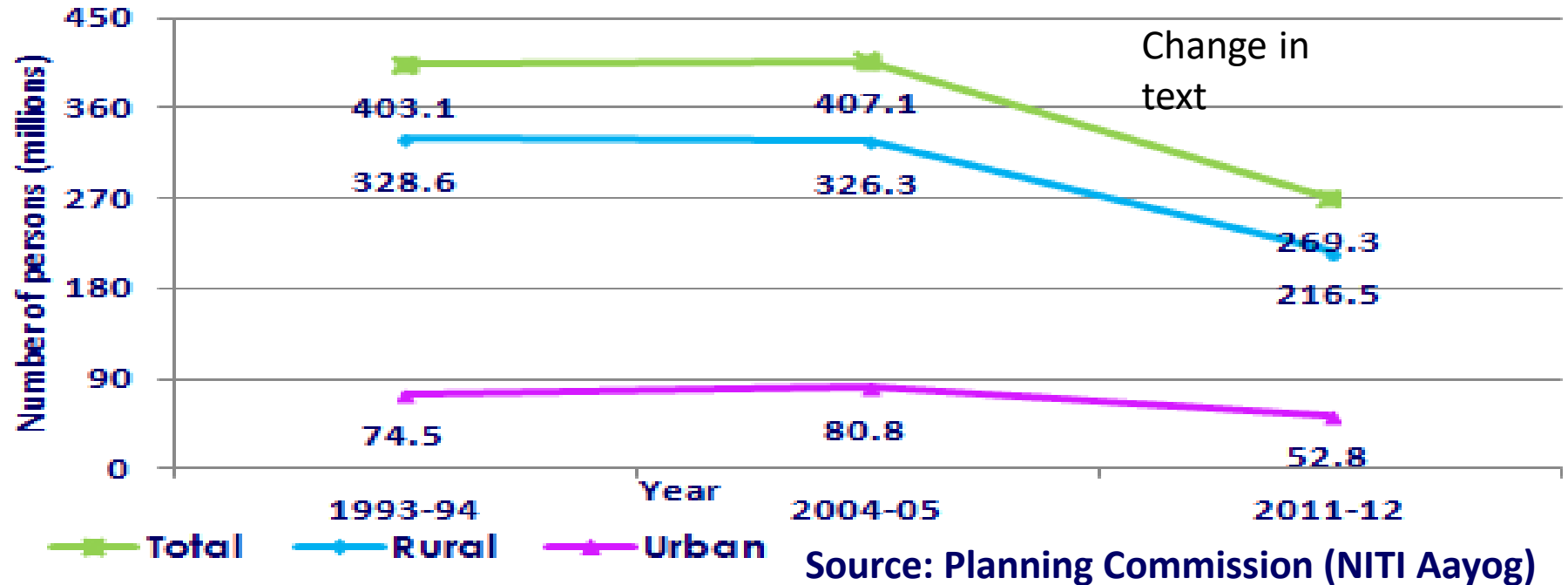
**These provide excellent insights into ongoing nutrition transition in the country and emergence of the dual nutrition burden in India**

# **DETERMINANTS OF DUAL NUTRITION BURDEN**

# **ECONOMIC TRANSITION AND FOOD CONSUMPTION**

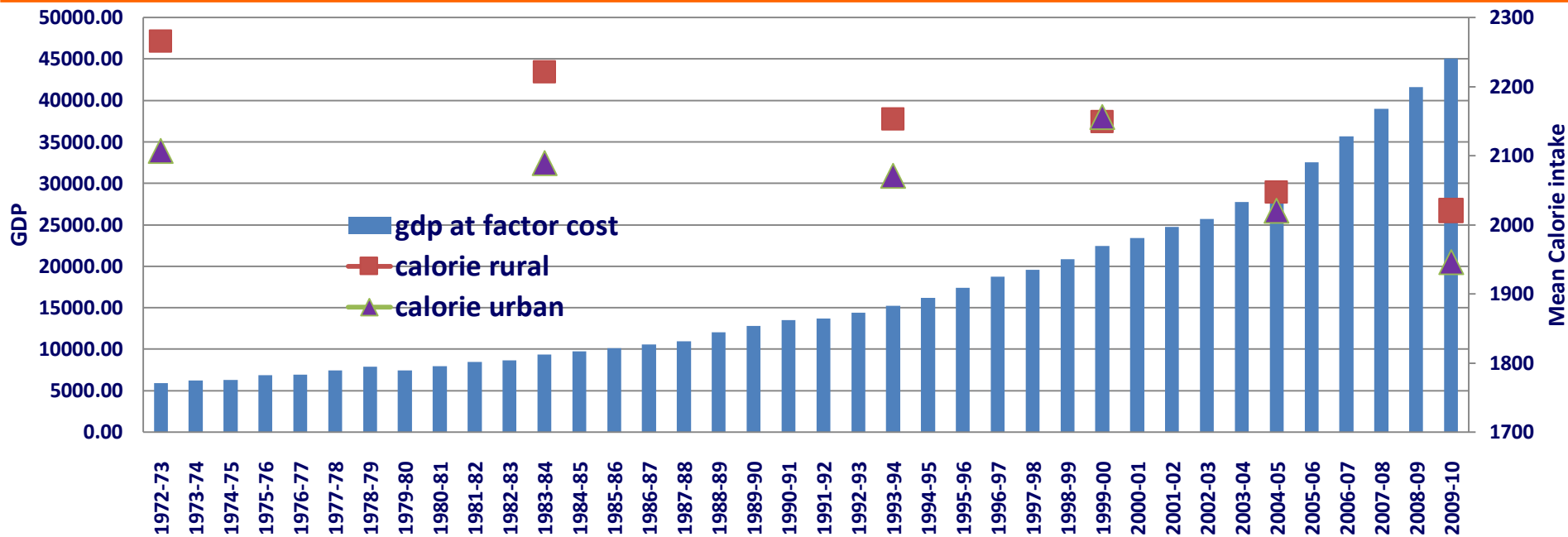
# POVERTY ALLEVIATION

## Number of persons Below Poverty line - India



- Between 1950 to 1990 GDP growth was slow.
- In the new century , there was acceleration in GDP growth. India has been second fastest growing economy in the last decade
- There has been accelerated decline in number of poor persons
- India has achieved the MDG goals for poverty reduction.

# UNIQUE INDIANS: GDP RISE GOES WITH FALL IN ENERGY INTAKE



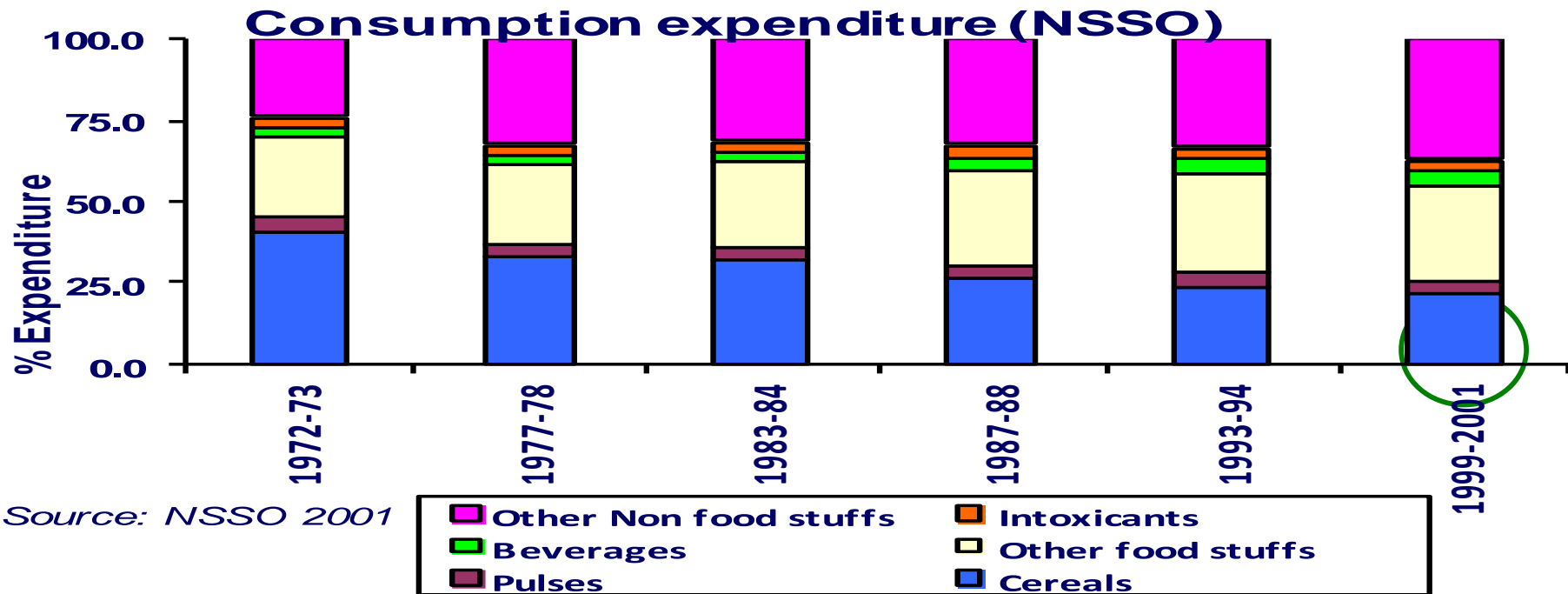
Global experience has shown that rise in GDP growth rate and percapita income are accompanied by increased animal food consumption and energy intake

In India there has not been much increase in animal food intake; there has been a progressive reduction in energy consumption.

The average intake is still adequate to meet the energy requirement because of the reduced physical activity.

The reduction in energy intake might have protected Indians from rapid rise in over-nutrition rates.

# FOOD AND NON FOOD EXPENDITURE - TIME TRENDS



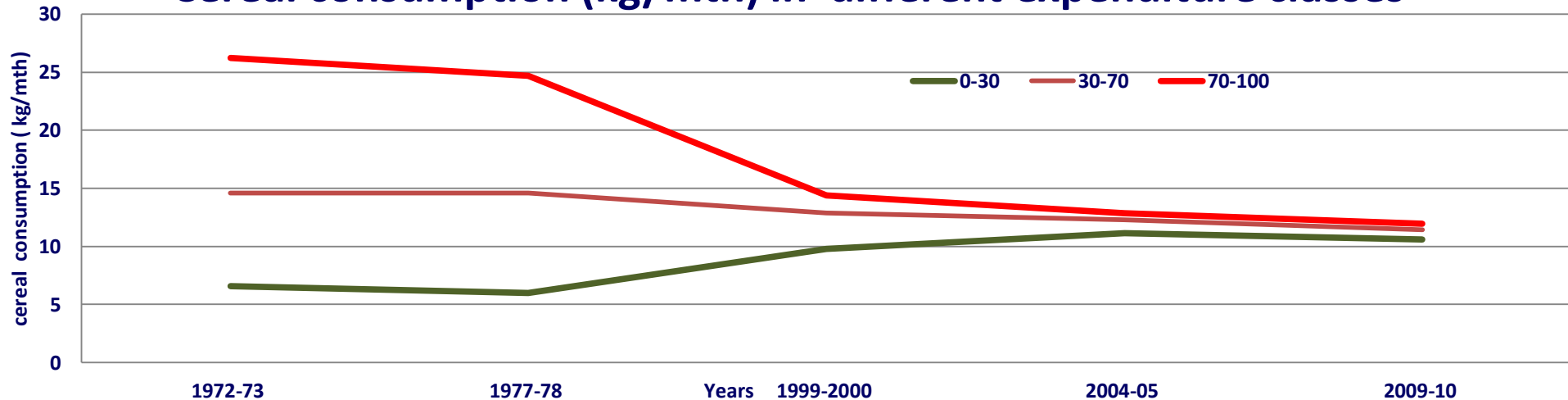
There has been a reduction in household expenditure on food as proportion of total household expenditure

But there is no reduction in food grain intake because of availability of low cost food grains through PDS.

**SHOULD THIS BE VIEWED AS A SUCCESS OF THE ADMINISTERED FOOD PRICES AND PDS?**

# IMPACT OF POVERTY ALLEVIATION PROGRAMMES AND SUBSIDISED FOOD GRAINS THROUGH PDS ON CEREAL INTAKE

Cereal consumption (kg/mth) in different expenditure classes



**Cereals are the major source of energy in Indian diets.**

**Over the last four decades there has been a decline in cereal consumption (and energy intake) among the rich and increase in cereal consumption among the poor.**

**As of 2009-10 cereal intakes are essentially similar in all groups, and is sufficient to meet their requirements.**

**Perceptive Indians changed their cereal (main source of energy) consumption even before revision of RDA for Indians!**

# TIME TRENDS IN IN NUTRIENT INTAKE

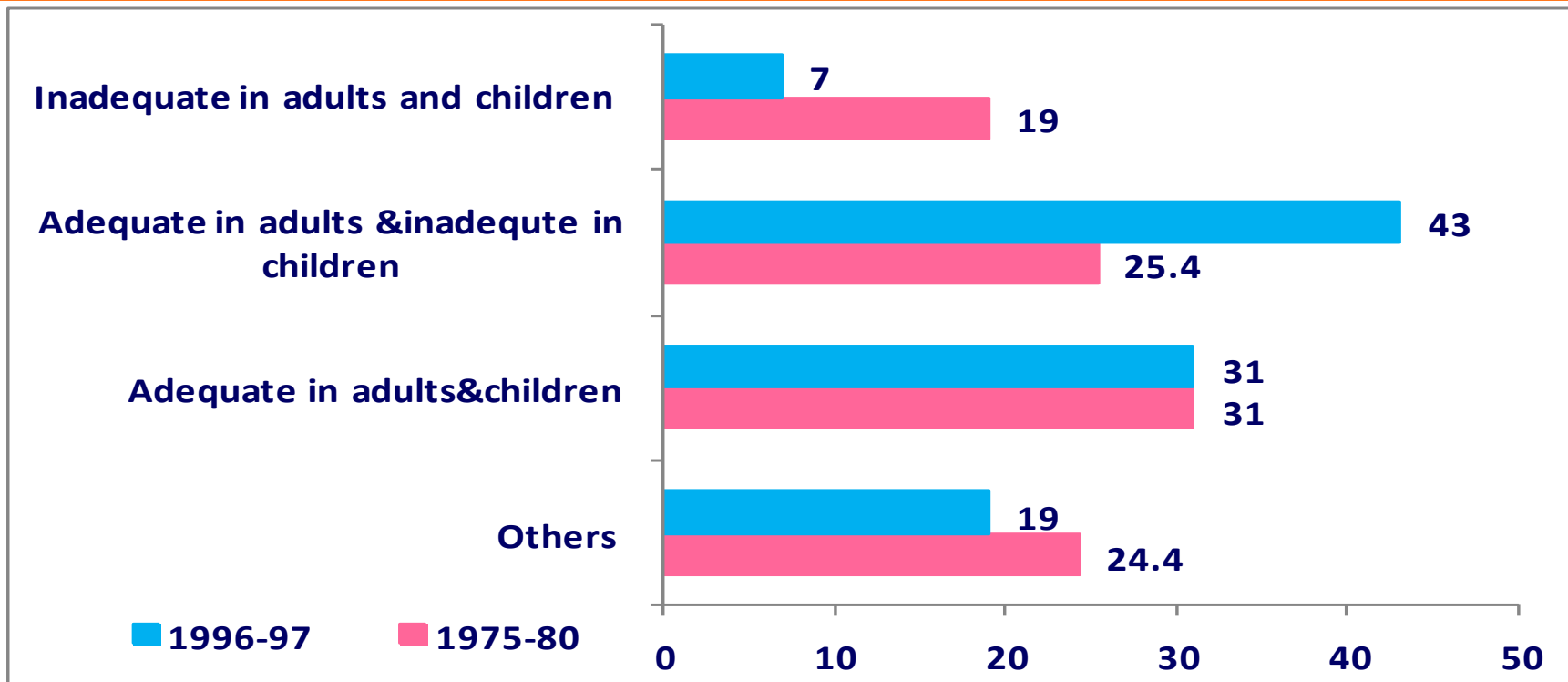
## NUTRIENT INTAKE IN RURAL AND URBAN (CU/DAY) NNMB

	1975-79	1988-90	1996-97	2000-01	2004-05
Energy (Kcal)	2340	2283	2108	2255	1834
Protein (g)	62.9	61.8	53.7	58.7	49.4
Calcium (mg)	590	556	521	523	439
Iron (mg)	30.2	28.4	24.9	17.5@	14.8
Vitamin A	257	294	300	242	257
Folic acid	*	*	153	62	52.3

Data from NNMB surveys confirm the NSSO findings that there has been a decline in energy intake especially in the last decade  
However the average energy intake is sufficient to meet the RDA

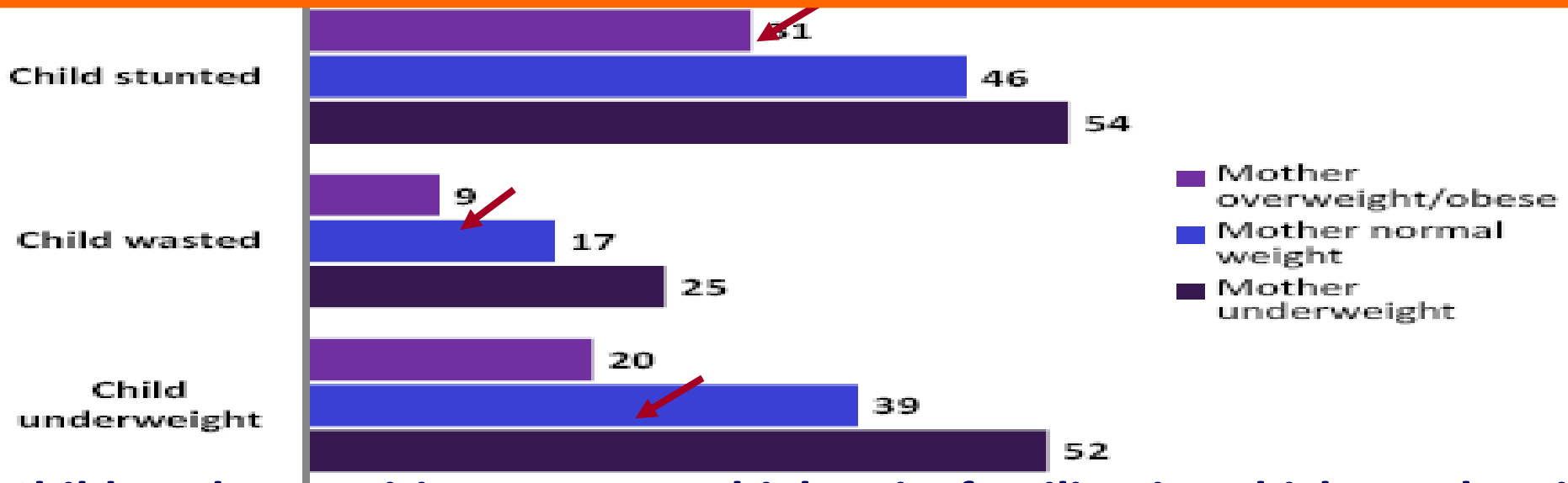


# INTRA FAMILY DISTRIBUTION OF FOOD (NNMB)



Data from NNMB surveys indicate that even in households where adults are getting adequate food children are not getting adequate food. This trend has been worsening over years and currently in over 50% of the households, adults are getting adequate food but children do not. Poor child feeding and caring practice and not poverty is increasingly becoming the major factor leading to under-nutrition in pre-school children.

# INTRA-FAMILY DUAL NUTRITION BURDEN (NFHS -3)



Child under-nutrition rates are higher in families in which mother is undernourished. But even if mother is normal, over 40 % of children are underweight.

Poor IYCF, intra-family distribution of food and poor health care rather than poverty is increasingly responsible for under-nutrition in preschool children.

Nutrition & health education on balanced adequate food, and physical activity hold the key for optimal health and nutrition for all age groups in the family

# PHYSICAL ACTIVITY

# PHYSICAL ACTIVITY



India 2010



India 1960



Until two decades ago Indians had adequate moderate physical activity in domestic occupational and transport domains.

So in spite of sedentary discretionary activity, overall physical activity levels in Indians was moderate

Over the last five decades physical activity in daily chores had declined.

Discretionary physical activity continues to be sedentary.

Steep reduction in physical activity is the major factor responsible for the rise in over-nutrition rates in India

# PHYSICAL ACTIVITY STATUS OF MEN & WOMEN IN RURAL INDIA

Source: Human nutrient requirements and RDA for Indians ICMR 2010

Activity status	Men		Women		Total	
	No	%	No	%	No	%
Sedentary	1349	33.3	2765	62.7	4114	48.6
Moderate	2650	65.5	1632	37.0	4282	50.6
Heavy	48	1.2	14	0.3	62	0.8

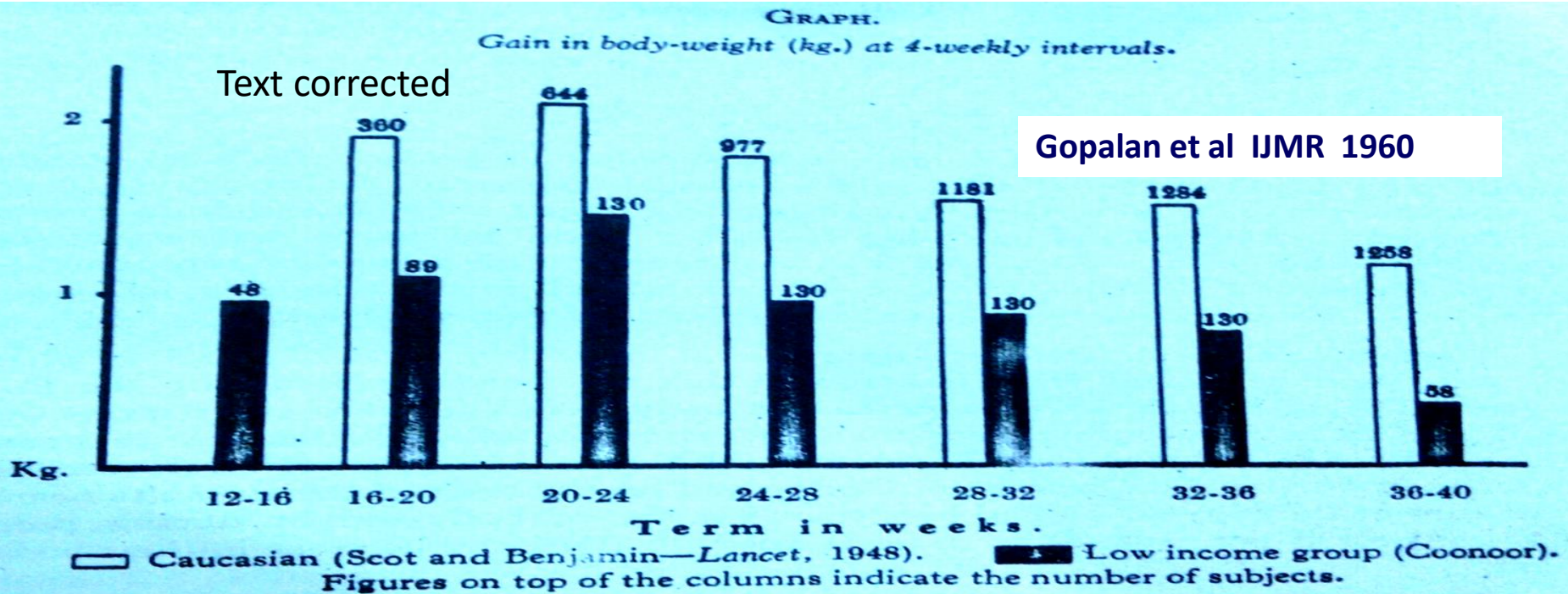
Over the last two decades, there has been progressive increase in mechanization of transport, occupational and household activities. Consequently there has been reduction in physical activity and energy needs in urban and rural areas even among the poor.

The population perhaps realised this and reduced their energy intake. Moderate physical activity is essential for good health. Efforts are underway to build awareness on importance of physical activity & create conducive environment to increase discretionary physical activity among all segments of population.

# **DIMENSIONS OF DUAL NUTRITION BURDEN IN INDIA**

# DUAL NUTRITION BURDEN BEGINS IN UTERO

# WEIGHT GAIN IN PREGNANCY IN INDIAN PREGNANT WOMEN



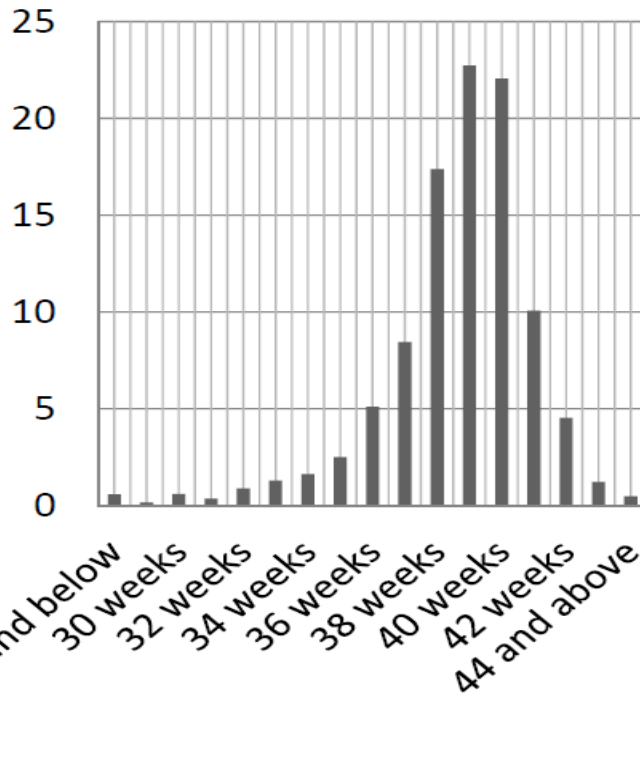
In 1950s weight gain in Indian pregnant women was low - half that of British women

Low parental height, low pre-pregnancy weight, low pregnancy weight gain and anaemia were major factors responsible for the low mean birth weight of the offspring and high low birth weight rates



## Mean Weight for Each Week of Gestation

Percentage of Birth by week



Text changed

Gestational age (weeks)	Number of observations	Mean weight (gm)	S.D
28 and below	29	922	282.0
29	8	1,117	234.3
30	30	1,326	279.1
31	18	1,499	417.2
32	45	1,608	314.0
33	65	1,941	562.9
34	82	2,052	616.9
35	126	2,205	620.1
36	257	2,421	553.3
37	425	2,691	464.5
38	874	2,760	442.8
39	1,143	2,843	432.4
40	1,110	2,895	460.3
41	506	2,911	459.7
42	228	2,927	440.8
43	61	3,000	379.7
44 and above	24	2,780	411.3

• Ref: Ghosh, Bhargava, et al; Pediatrics, Vol. 47, No. 5, May 1971

**Birth weight of Indian neonates are lower as compared to Caucasian neonates at all periods of gestation. Majority of births occurred between 38-40 weeks.**

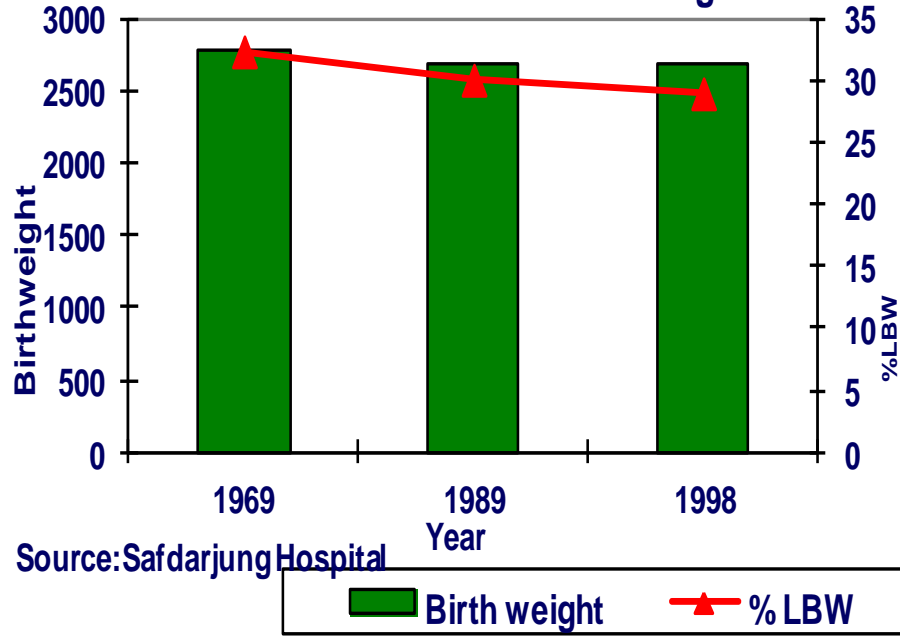
**As a result low birth weight rates in India were high.**

**Preterm births were relatively low below 15%**

# CONSEQUENCES OF LOW BIRTH WEIGHT

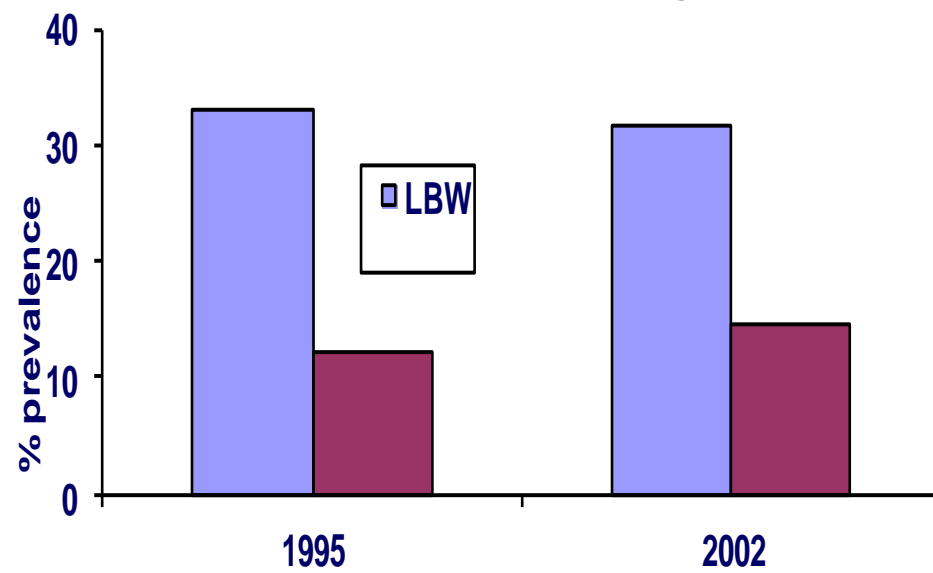
- Low birth weight can be due to Intrauterine growth retardation (IUGR) or preterm birth.
- Majority of LBW babies in India are term IUGR. Their survival chances are much better than the pre-term babies with similar birth weight.
- With warmth, breast feeding and prevention of infection most term IUGR babies will survive.
- Only preterm babies and those weighing below 2kg require intensive care in nurseries.
- India has been following these norms and had saved millions of lives within existing health care constraints

Time trends in birth weight



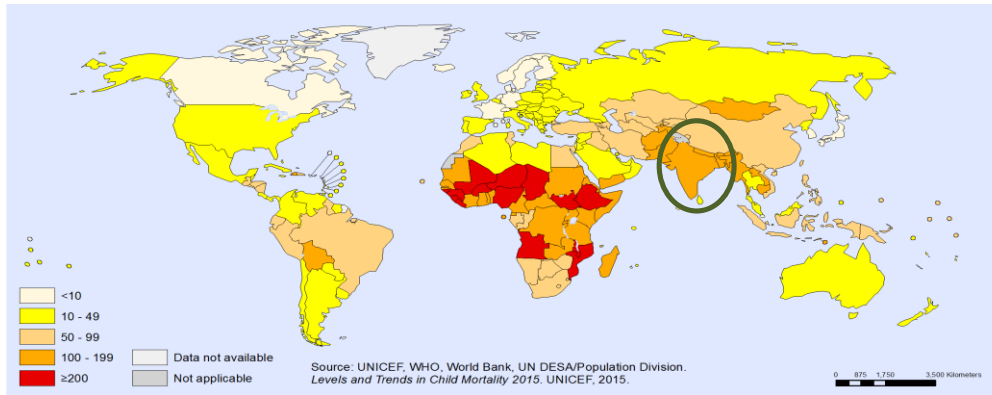
- Over decades there has not been any substantial reduction in LBW.
- Majority of LBW babies are mature. Prevalence of preterm births is about 12%.
- India still has the highest LBW rates in the world, but IMR in India is comparable to other developing countries.

Prevalence of Low birthweight -NNF



# SOUTH ASIAN ENIGMA

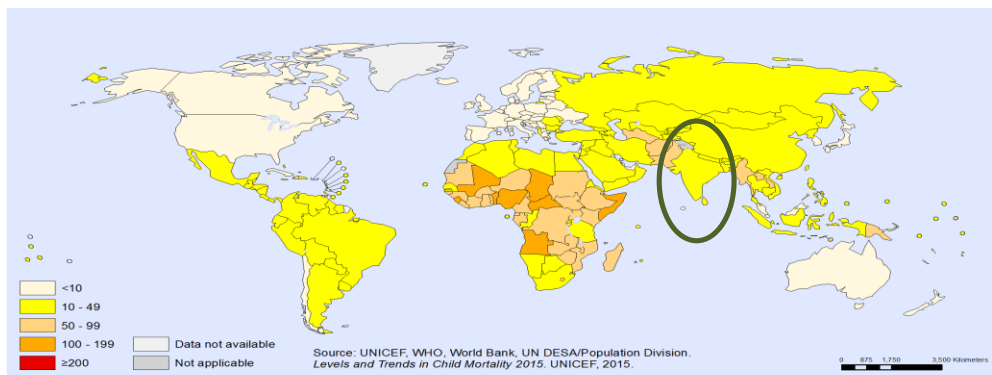
## UNDER FIVE MORTALITY 1990



Major reason for global concern over low birth weight is the high mortality associated with it.

Despite high LBW rates (30%) and U5 under-nutrition rates (>40%) NNMR, IMR and U5MR in India both in 1990 and in 2015 are comparable to other countries (South Asian enigma).

## UNDER FIVE MORTALITY 2015



Mature small Indian neonate survives, if provided essential neonatal care, but they grow along a lower trajectory as compared to neonates with higher birth-weight

# DUAL NUTRITION BURDEN BEGINS IN UTERO

Low birth weight (<2.5kg ) rate in India about 30%; about 2 % of Indian infants have high birth weight

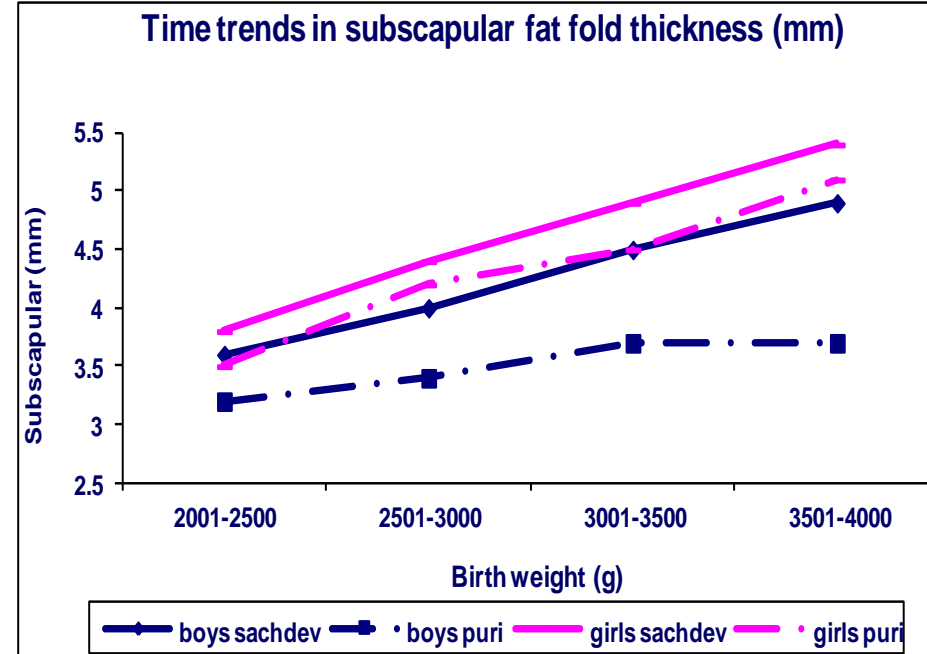
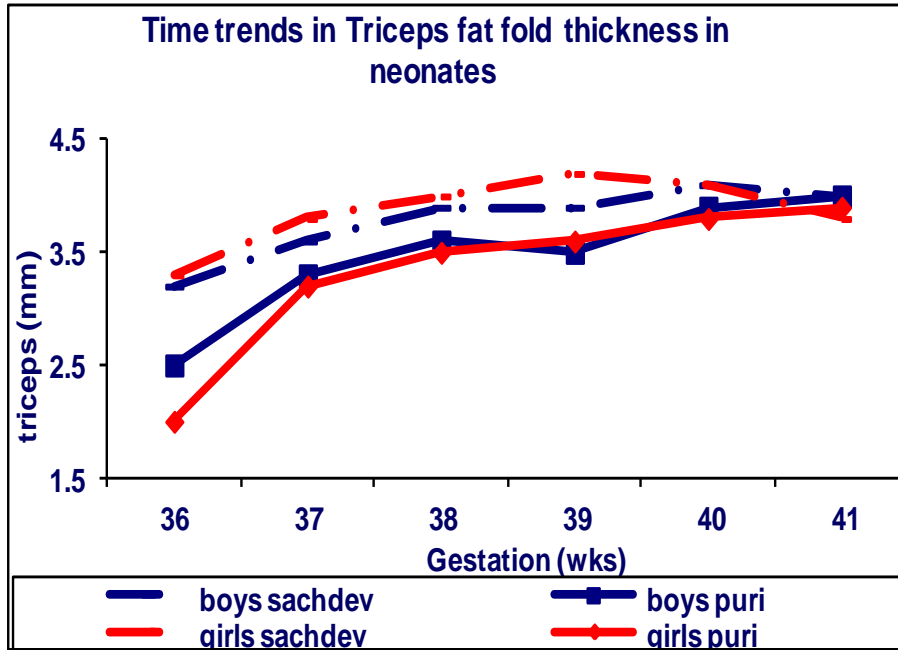
Low maternal height, low pre-pregnancy weight, low maternal weight gain and anaemia in pregnancy are major factors associated with low birth weight in India - **trans-generational impact of maternal under-nutrition**

Gestational diabetes with maternal over-nutrition predisposes to large for date babies - **trans-generational impact of maternal over-nutrition**

Pregnancy induced hypertension with or without diabetes is emerging as an important obstetric factor predisposing to LBW

**Effective antenatal care including treatment for anaemia, PIH & food supplements when needed can reduce LBW by about 5%**

# THE THIN-FAT INDIAN NEONATE



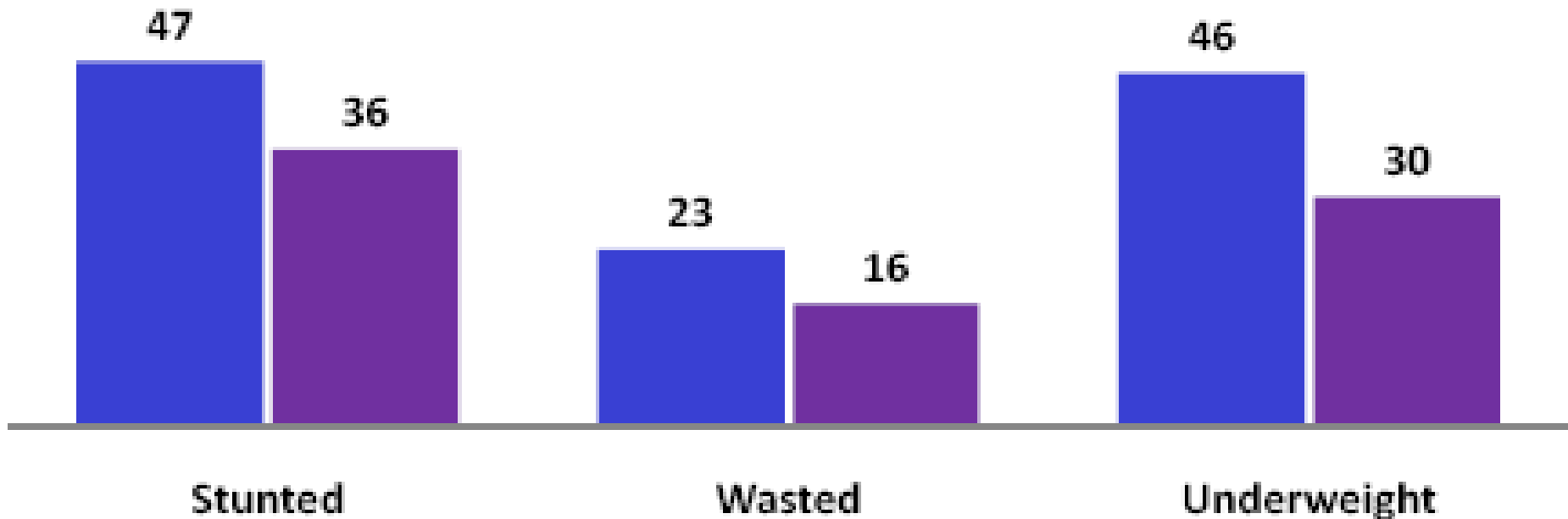
Indian neonates are short and thin; they have low muscle mass but fat mass is spared.

Over the last two decades there has been no change in birth weight but there has been an increase in fat fold thickness of neonates - in boys and girls, in all gestational age and birth weight categories

Indian's proneness for adiposity begins in utero

# BIRTH-WEIGHT IS A CRITICAL DETERMINANT OF GROWTH (NFHS3)

■ Less than 2.5 kg      ■ 2.5 kg or more



Forty years later, data from NFHS 3 showed that birth-weight continued to remain a major determinant of growth during infancy childhood, adolescence and adult life.

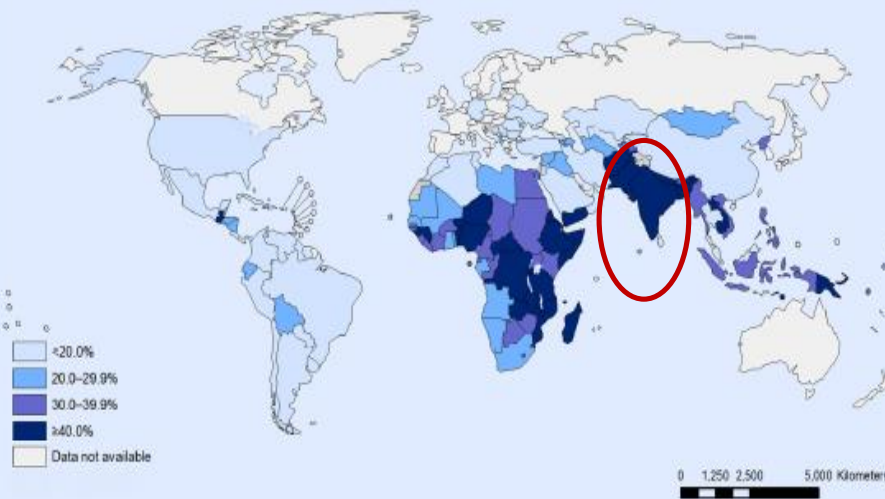
In pre-school children stunting, underweight and wasting rates are higher in those who weighed less than 2.5 kg at birth as compared to those who had birth weight  $\geq 2.5$ kg

# **UNDER-NUTRITION IN PRE-SCHOOL CHILDREN**

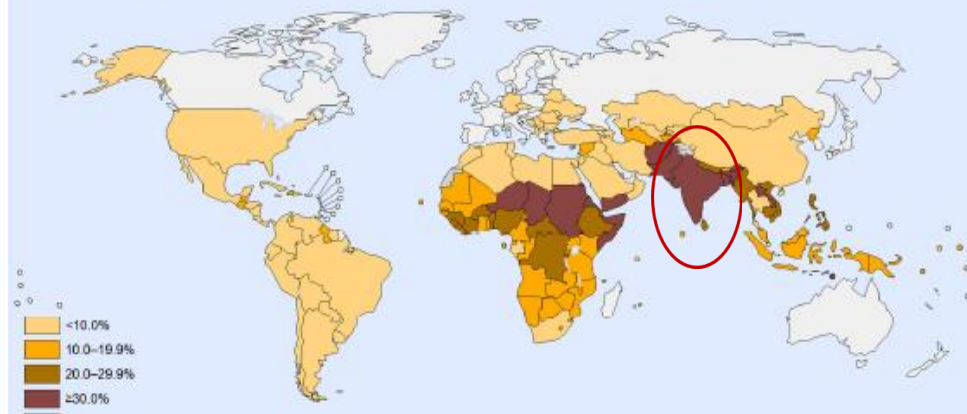


# MONITORING FOOD SECURITY- UNDER-NUTRITION RATES

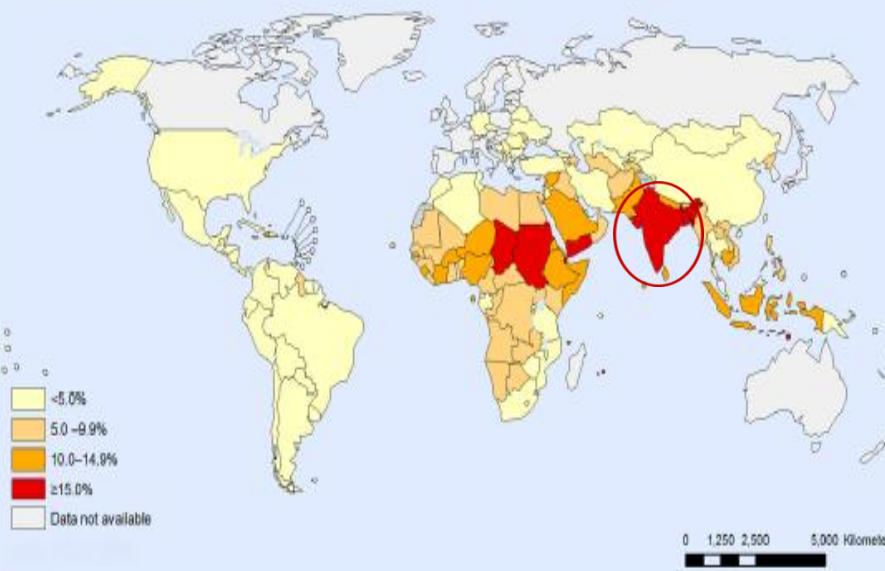
## STUNTING



## UNDERWEIGHT



## WASTING



Stunting, underweight and wasting rates in Indian pre-school children are among the highest in the world.

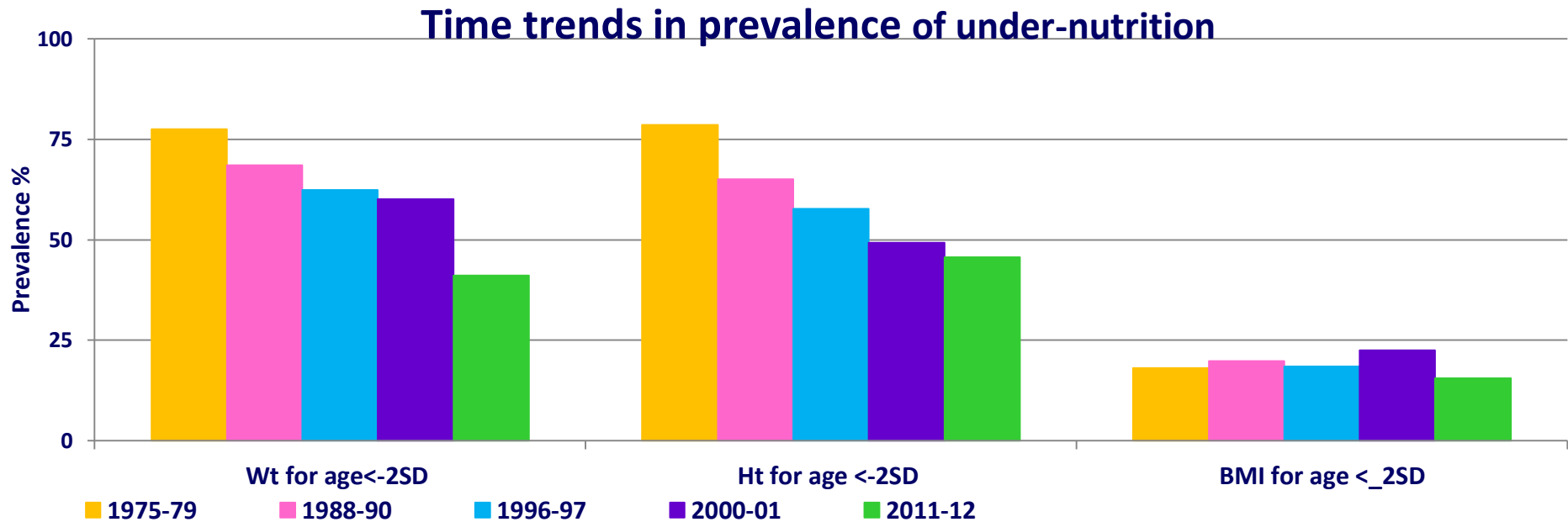
This results in India's low global ranking in food security.

High under-nutrition in U5 in India is not due to household food insecurity

Low birth weight and poor IYCF are the major determinants of lower growth.

SOFI 2013 acknowledged the dichotomy between food insecurity and child under-nutrition in South Asia

# TIME TRENDS IN PREVALENCE OF UNDER-NUTRITION IN INDIA (NNMB)

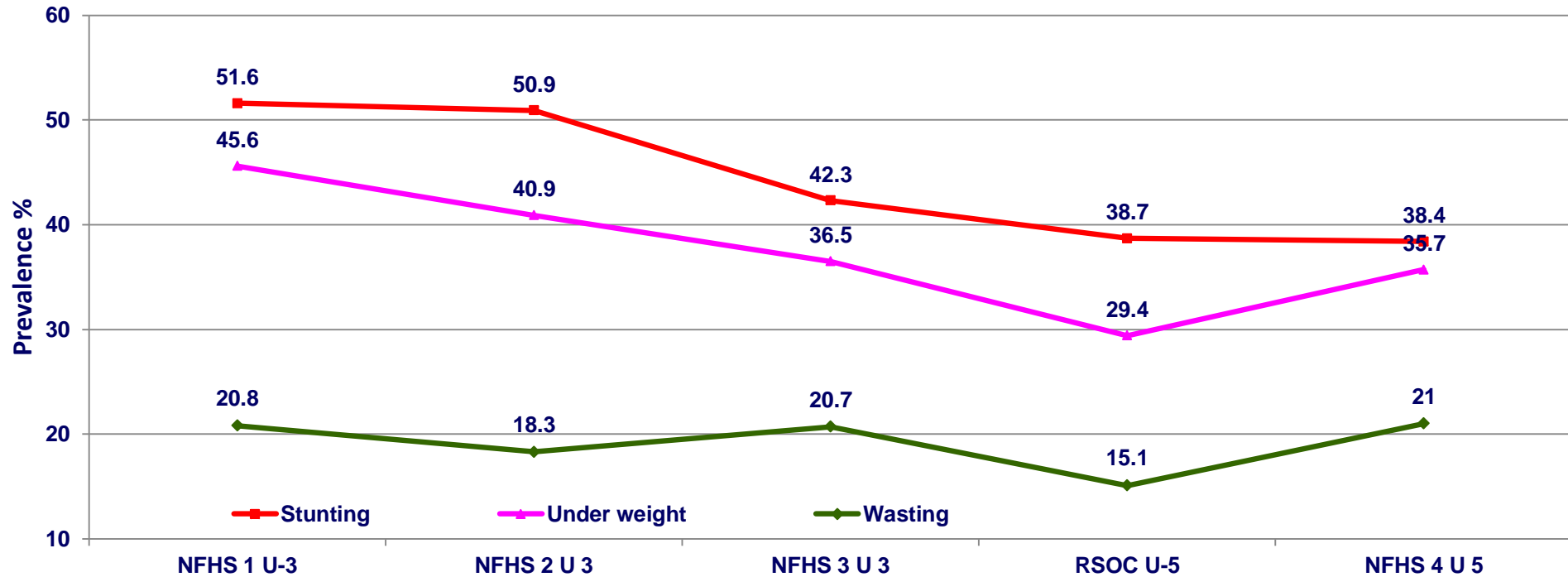


There has been a slow but steady decline in severe and moderate under nutrition (weight-for-age and height-for-age) in pre-school children, but wasting rates have remained unaltered

It was assumed that reduction in stunting will result in these children growing into taller adults.

But this did not happen because change in prevalence of stunting (<-2SD group) cannot result in increase in average adult height.

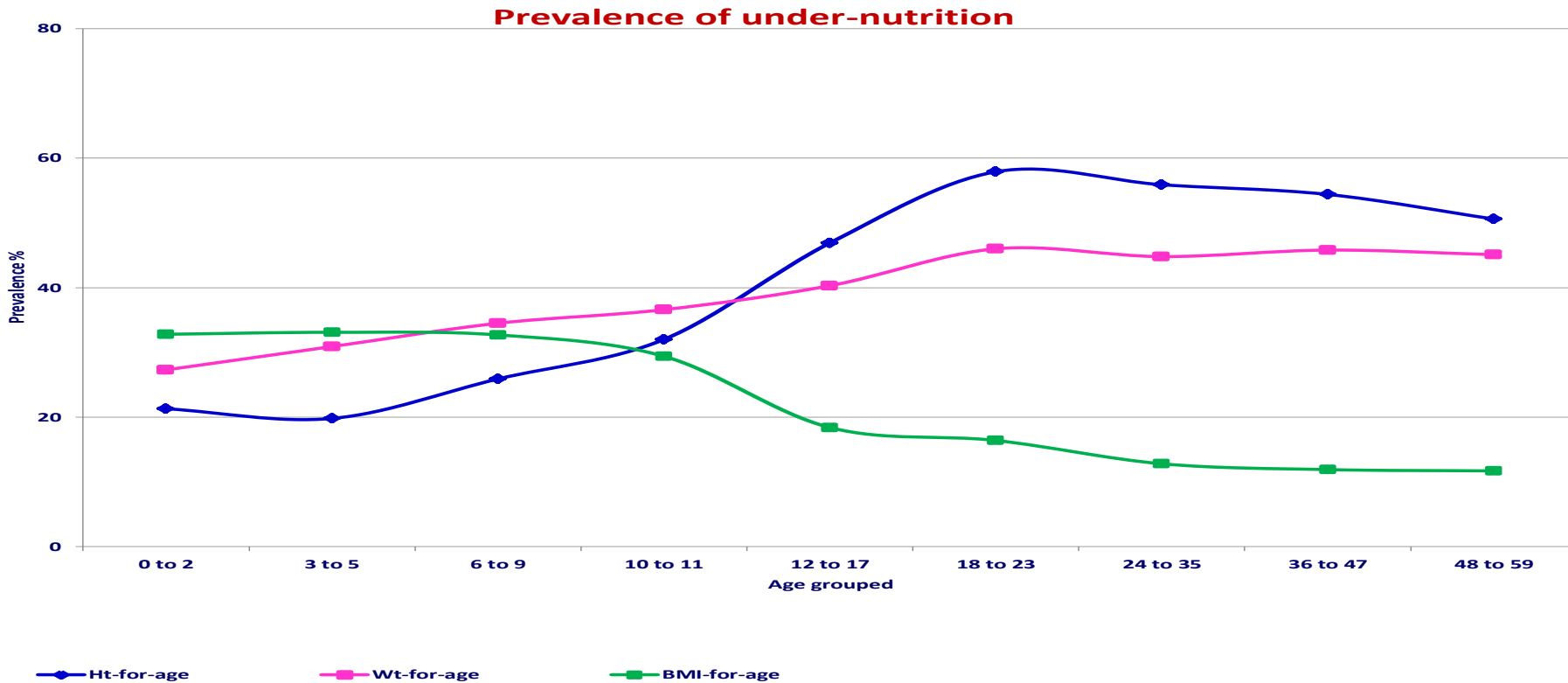
# TIME TRENDS IN PREVALENCE OF UNDER-NUTRITION IN INDIA



Over the last two decades there has been a slow but steady decline in stunting and under-weight rates; but the country failed to bring about a 50% reduction in under-five underweight and stunting rates between 1990 and 2015

Over decades there has been very little reduction in the prevalence of wasting (a sign of current energy deficiency).

# AGE RELATED CHANGES IN PREVALENCE OF UNDERNUTRITION IN U5 CHILDREN



Up to 24 months, there is rise in prevalence of stunting and underweight with increasing age .

Wasting shows a reduction in prevalence between 9 months and 35 months  
BMI takes into account both age and current height of the child; therefore there is a reduction in the wasting rates with rise in stunting rate

# **WHO MGRS - USE OF BMI FOR ASSESSING NUTRITIONAL STATUS IN CHILDREN**

In children weight has been the most widely used anthropometric parameter to assess nutritional status; where possible height measurements were made

When under-nutrition was the major nutritional problem in children, underweight and stunting rates were used to assess prevalence of under-nutrition in children

With the emergence of dual nutrition burden, countries where stunting was common started to report that some stunted underweight children were overweight for their height. Some of them had risk factors associated with cardiovascular diseases

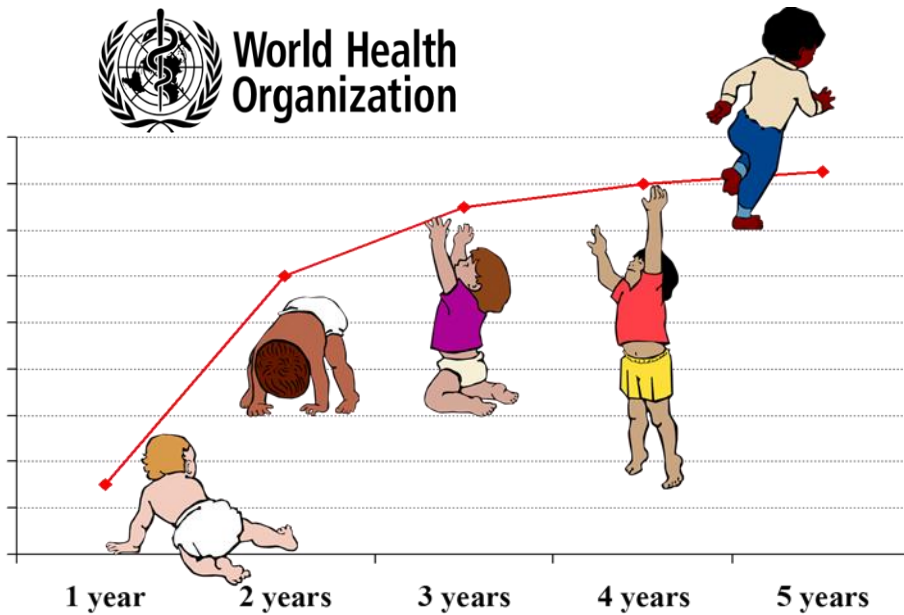
In adults BMI has been used as the parameter for assessing both under- and over-nutrition

In children BMI varies with age and because of lack of standards BMI-for-age was not used for assessing nutritional status in children

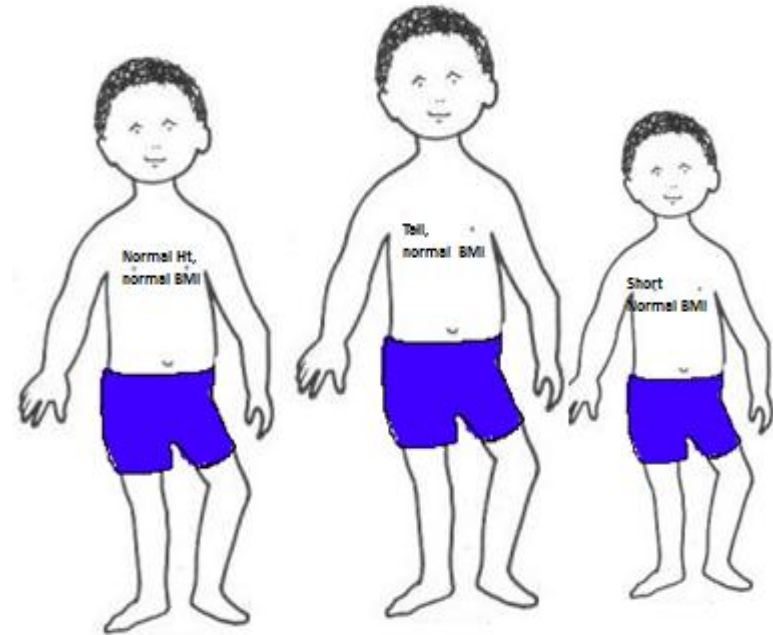
WHO developed the standards for BMI-for-age in under-five (WHO - MGRS 2006) and 5-18 years (WHO - anthro) and recommended that these should be used to assess both under- and over-nutrition in children.

India has accepted this recommendation

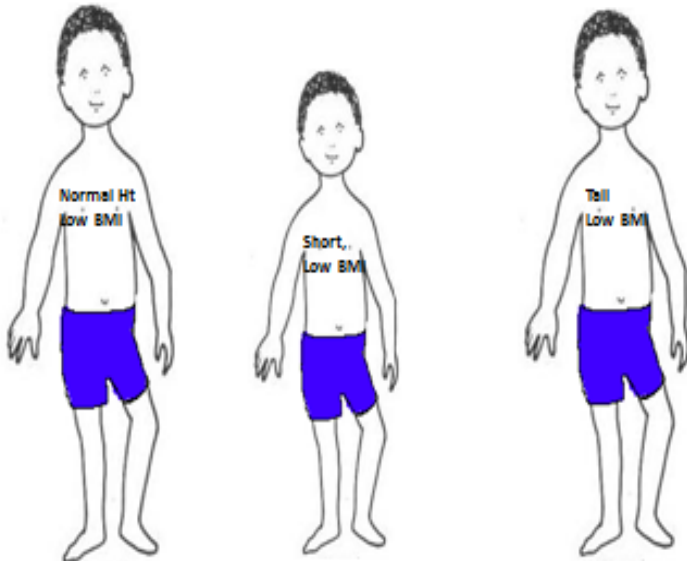
# WHO Child Growth Standards 2006



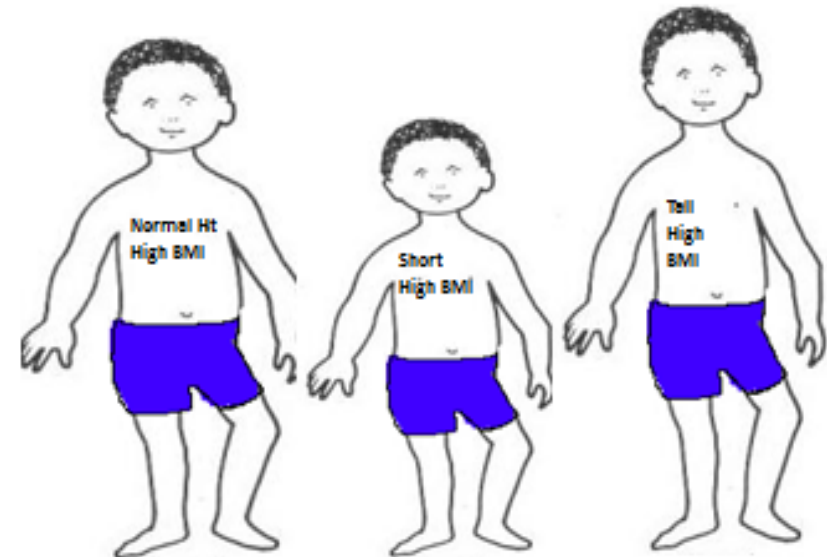
Children with normal BMI can be normal in height, tall or short.  
Children with normal BMI do not require nutritional interventions



Children with low BMI can have normal height, be tall or short.  
They **all** require additional energy intake to ensure linear growth



Children with high BMI can have normal height, be tall or short.  
They **all** require adequate physical activity to reach normal BMI



**DIMENSIONS AND DETERMINANTS OF  
DUAL NUTRITION BURDEN IN SCHOOL CHILDREN**

## **RDA FOR INDIAN CHILDREN**

<b>Group</b>	<b>Current mean wt</b>	<b>Requirement for current wt</b>	<b>Actual intake</b>	<b>Gap</b>
<b>Children</b>				
<b>1 - 3 yrs</b>	<b>10.5</b>	<b>840</b>	<b>714</b>	<b>-126</b>
<b>4 - 6 yrs</b>	<b>14.6</b>	<b>1095</b>	<b>978</b>	<b>-117</b>
<b>7 - 9 yrs</b>	<b>19.7</b>	<b>1379</b>	<b>1230</b>	<b>-149</b>
<b>Boys</b>				
<b>10 - 12 yrs</b>	<b>26.6</b>	<b>1729</b>	<b>1473</b>	<b>-256</b>
<b>13 - 15 yrs</b>	<b>36.8</b>	<b>2208</b>	<b>1645</b>	<b>-563</b>
<b>16 - 17 yrs</b>	<b>45.7</b>	<b>2514</b>	<b>1913</b>	<b>-601</b>
<b>Girls</b>				
<b>10 - 12 yrs</b>	<b>26.7</b>	<b>1469</b>	<b>1384</b>	<b>-85</b>
<b>13 - 15 yrs</b>	<b>36.9</b>	<b>2030</b>	<b>1566</b>	<b>-464</b>
<b>16 - 17 yrs</b>	<b>42.6</b>	<b>2130</b>	<b>1630</b>	<b>-500</b>

**The gap between the energy requirements needed for growth and actual energy intake was highest in school age boys and girls**

**As a result under-nutrition rates increase during this period**



# SEDENTARY LIFE STYLE

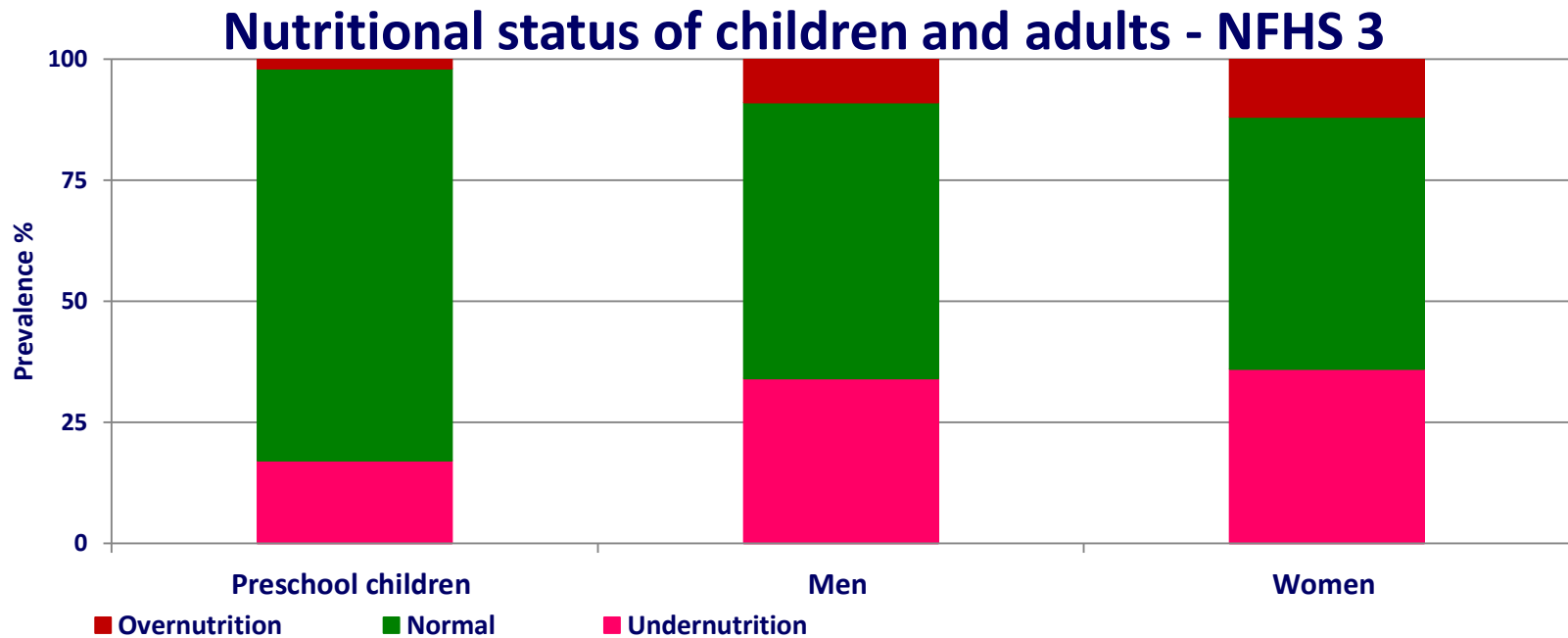
Excessive snacking Excessive time spent on T.V & computers



Increasing consumption of energy dense snacks, increasing time spent on TV watching/computer games and reduction in physical activity/play are some of the major factors responsible for the emerging problem of over-nutrition in children and adolescents especially from urban affluent families

**Nutrition and health education to combat these can prevent further escalation of over-nutrition and later even reverse the trend**

# DUAL NUTRITION BURDEN INCREASES DURING SCHOOL AGE



**In pre-school children prevalence of under-nutrition is 17% and over-nutrition is 2%.**

**In adults prevalence of under-nutrition is about 30% and over-nutrition is about 10%.**

**There has been a rise in prevalence of both under- and over-nutrition between pre-school age and adult years.**

**This rise could be prevented/minimised by MDM and physical activity in school age children.**

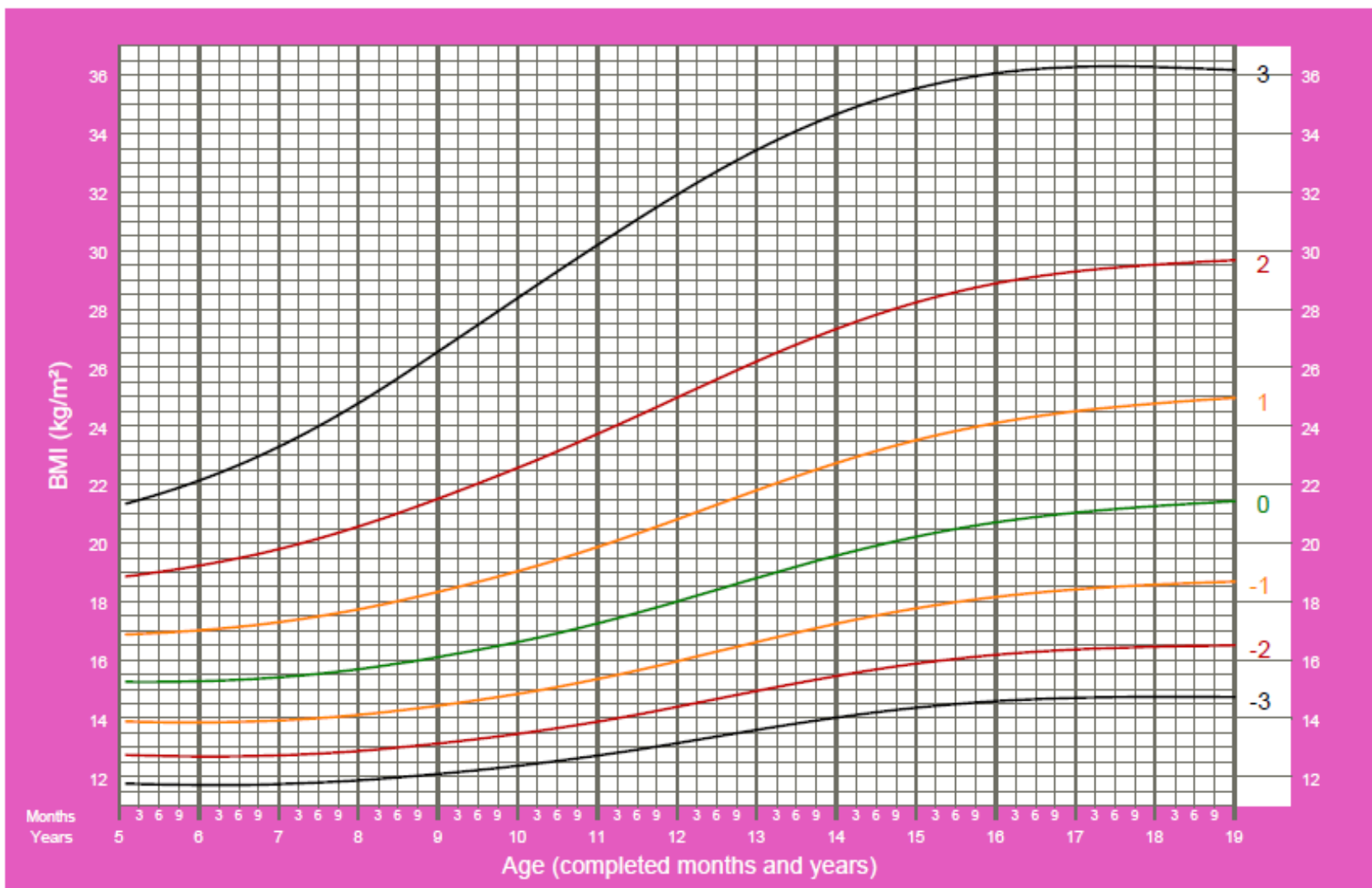
# WHO GROWTHCHARTS 5-19 YEARS

[www.who.int/growthref/en](http://www.who.int/growthref/en)



# BMI-for-age GIRLS

5 to 19 years (z-scores)

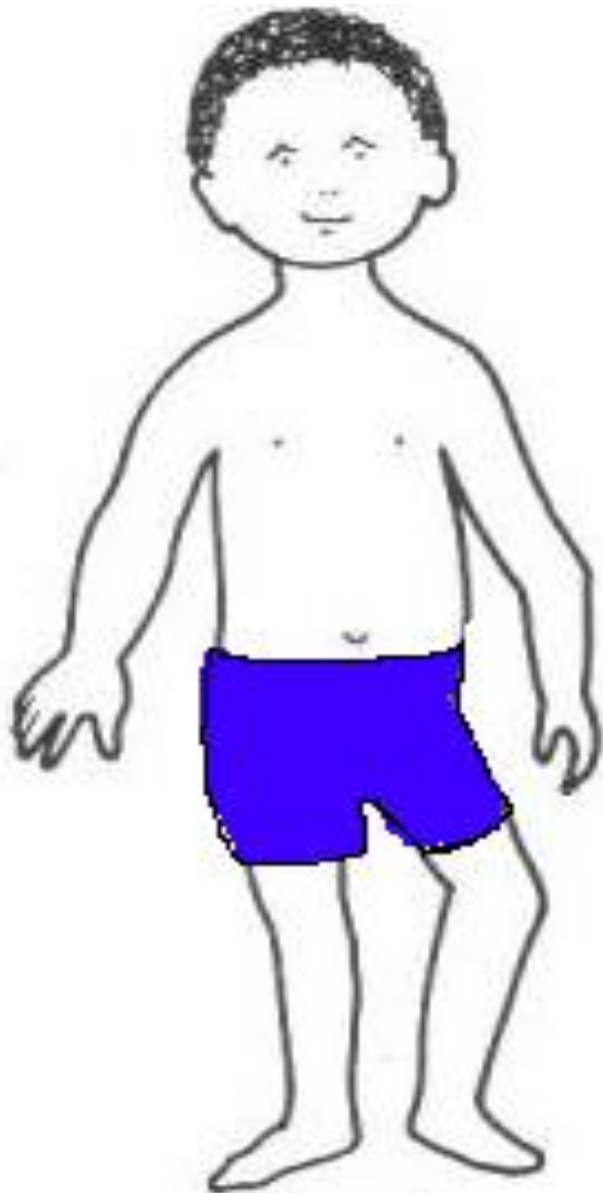


2007 WHO Reference

# BMI IN CHILDREN ( 7YR)

Normal height, weight  
& BMI

BMI 15.5



Normal height low Wt & low  
BMI

BMI 12.5



Stunted, low wt &  
normal BMI

BMI 14



Stunted, low wt &  
low BMI

BMI 12



These three children are underweight  
for their age

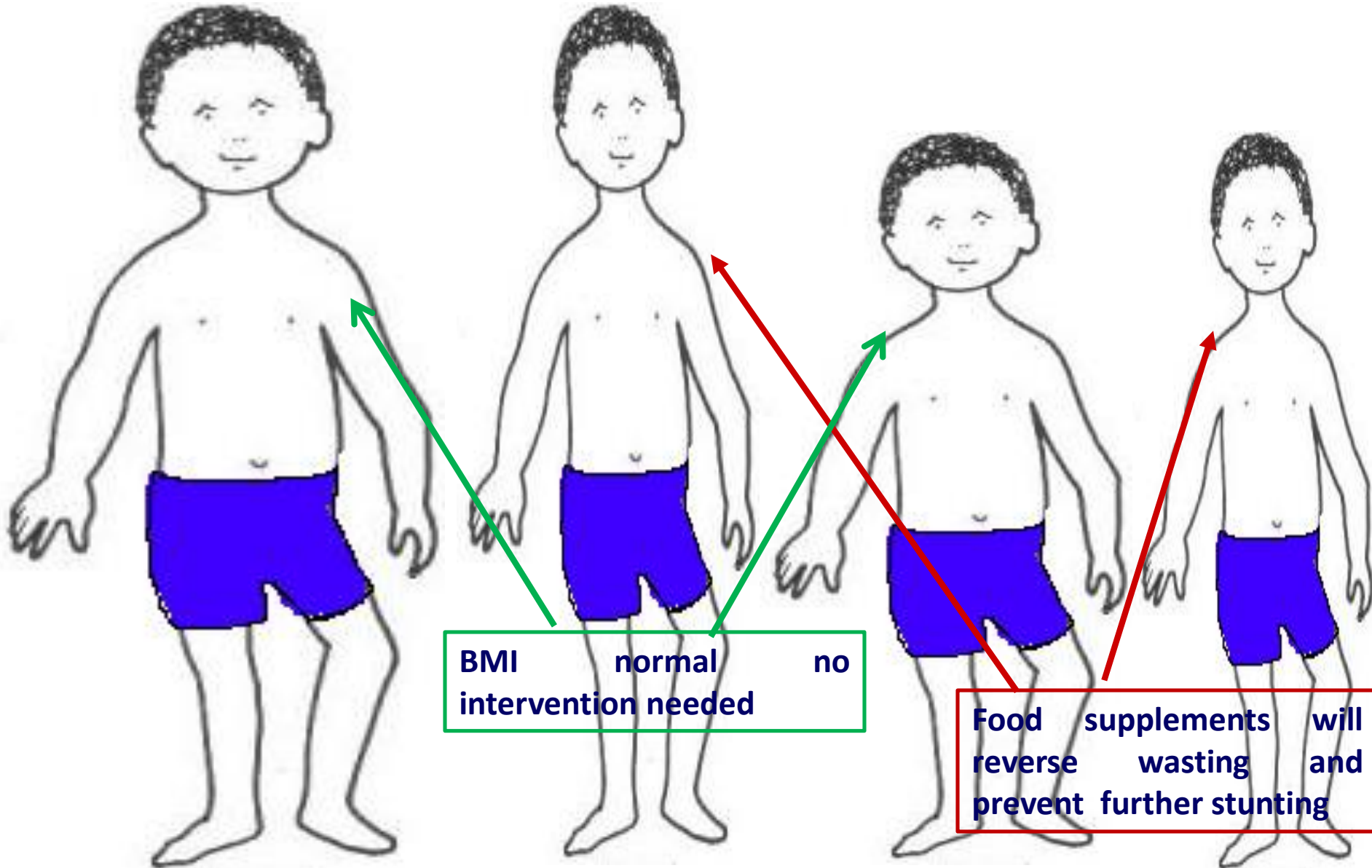
These two children are  
short for their age

**Normal height,  
weight & BMI**

**Normal height  
low Wt & low BMI**

**Stunted, low wt &  
normal BMI**

**Stunted, low wt &  
low BMI**



**BMI normal no  
intervention needed**

**Food supplements will  
reverse wasting and  
prevent further stunting**

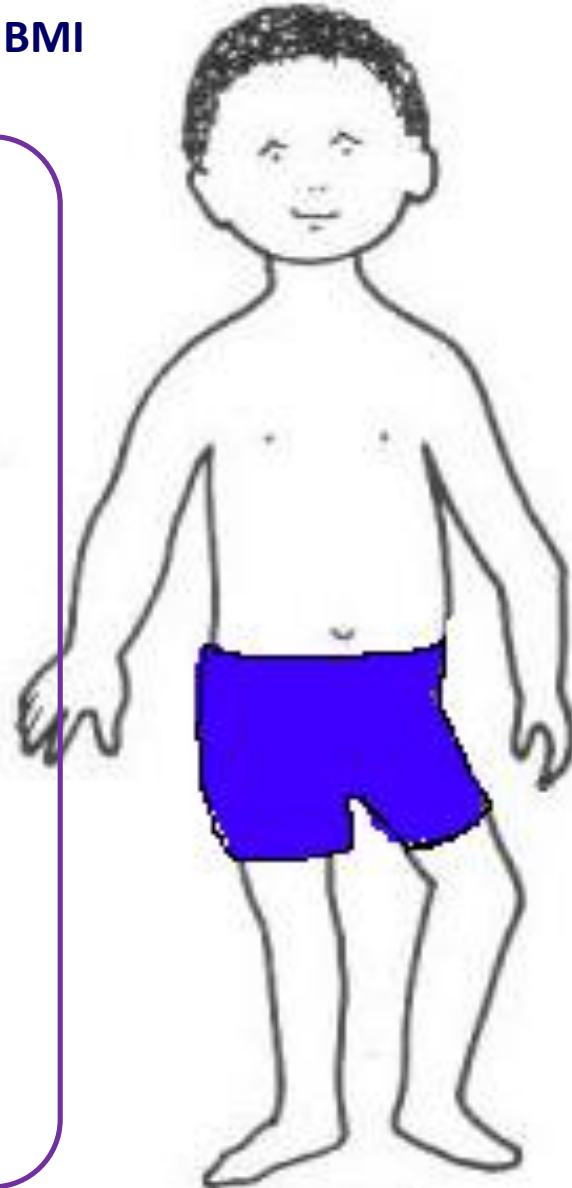
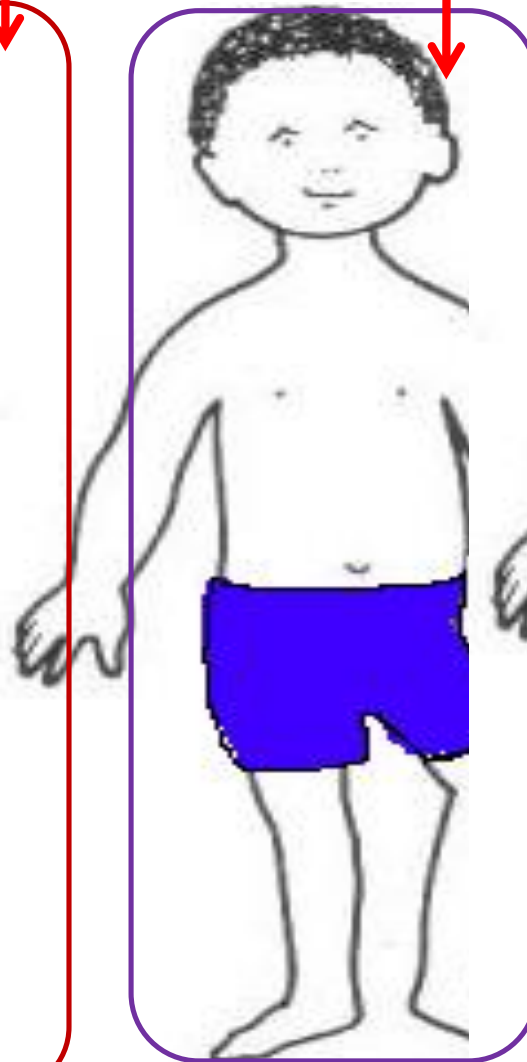
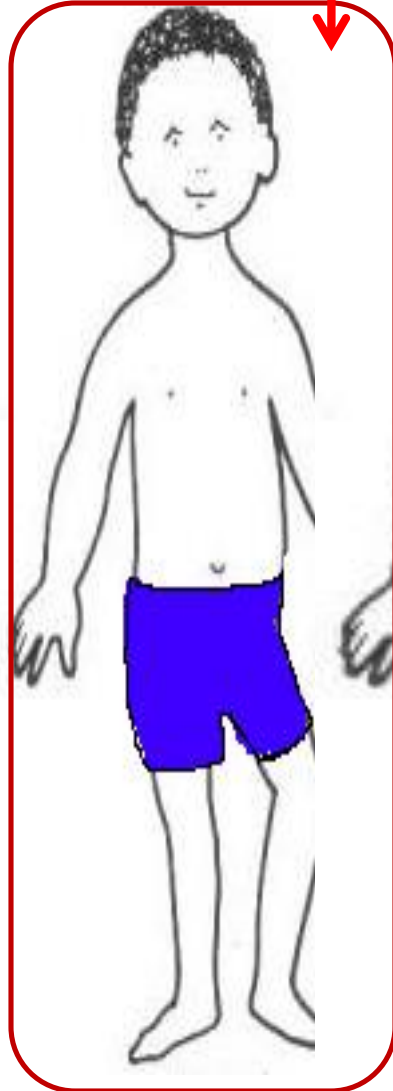
# Short and underweight children may have

Normal BMI

Food supplements will reverse prevent further stunting  
wasting and Low BMI

High BMI - will reverse high BMI  
exercise will

Normal height normal BMI

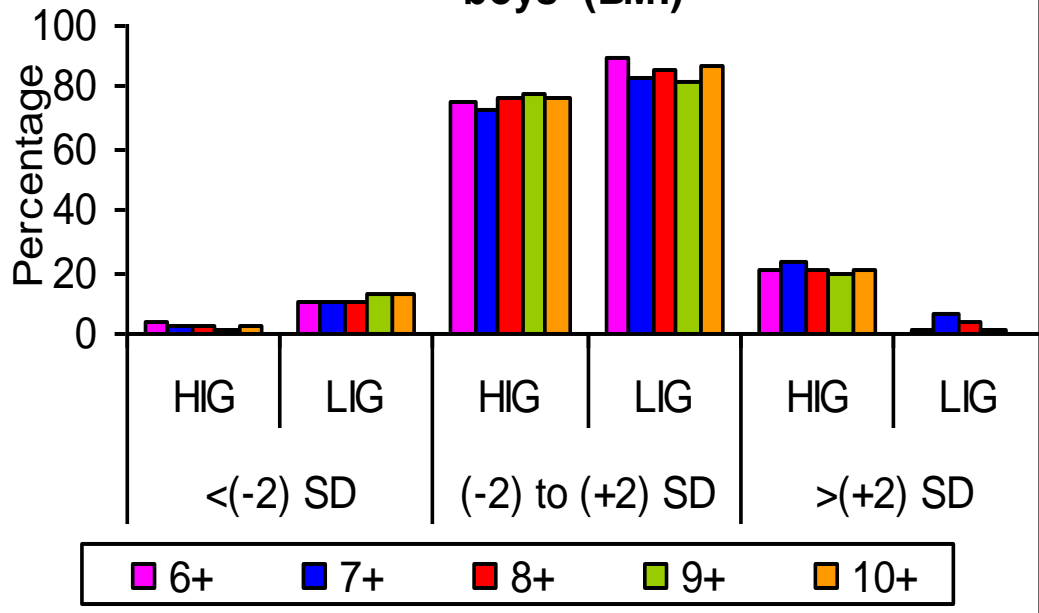


**Identify thin children and bridge their energy gap. This will reverse wasting and prevent stunting**

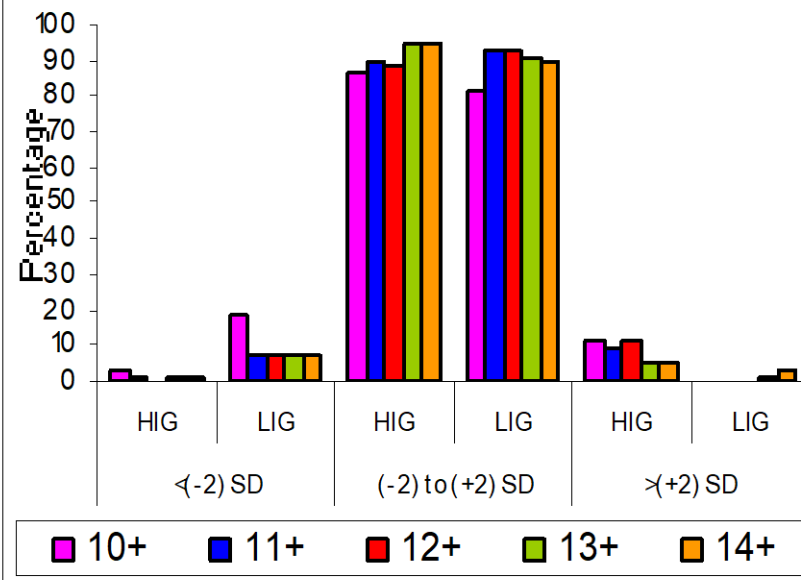
**Identify the over-nourished children and correct their life style; reduce intake of energy dense food and increase their physical activity. This will reduce their adiposity.**



**Prevalence of under & overnutrition in boys (BMI)**



**Prevalence of under & overnutrition in girls (BMI)**



Numerous studies in India have shown that under-nutrition is the problem in children from lower income group.

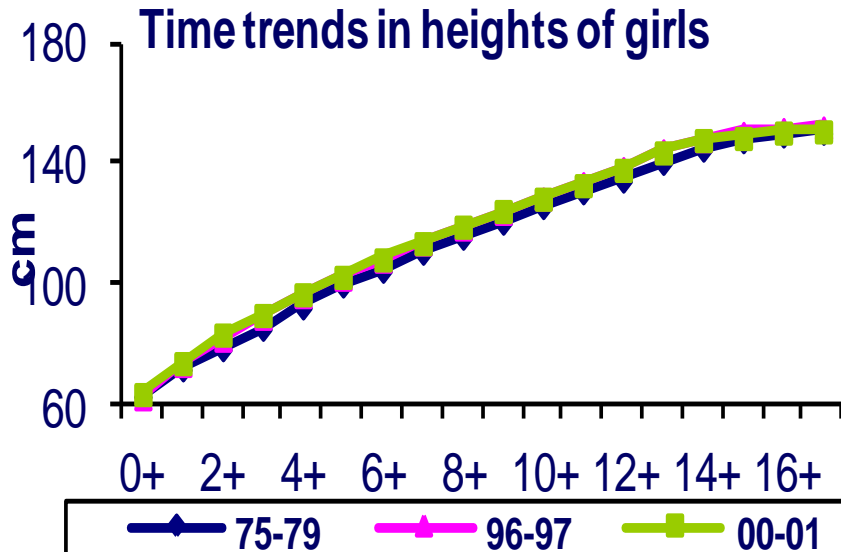
Screening for wasting and providing double portion of MDM to thin children can reverse wasting and promote linear during adolescent growth spurt

About 1/5<sup>th</sup> of the primary school children from private schools were over-nourished  
Health and nutrition education on healthy life style and adequate physical activity can reverse over-nutrition in childhood and adolescence.

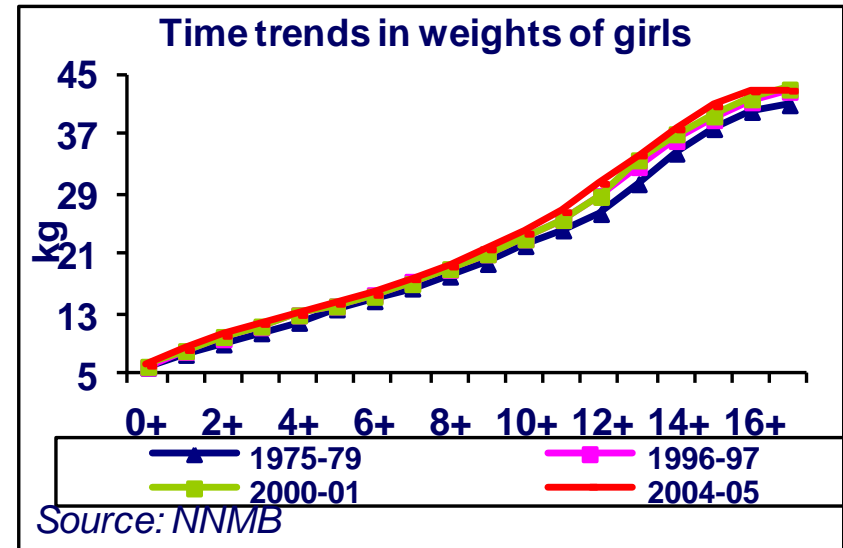
Studies from Delhi cohort have shown that infants who gain BMI in childhood become overweight adults, with high risk of non-communicable diseases.

Healthy life style built up in school children can prevent over-nutrition in adult life.

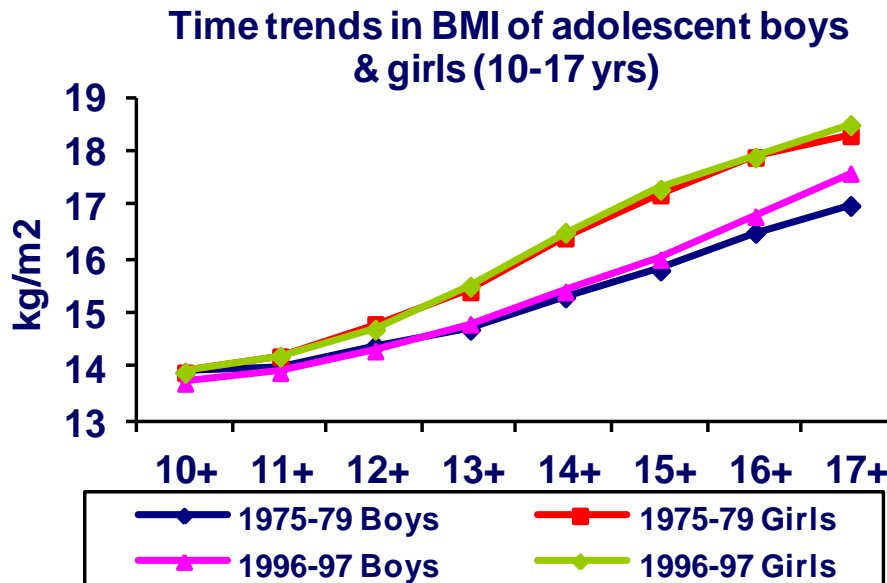
# NUTRITIONAL STATUS OF CHILDREN



Source: NNMB



Source: NNMB

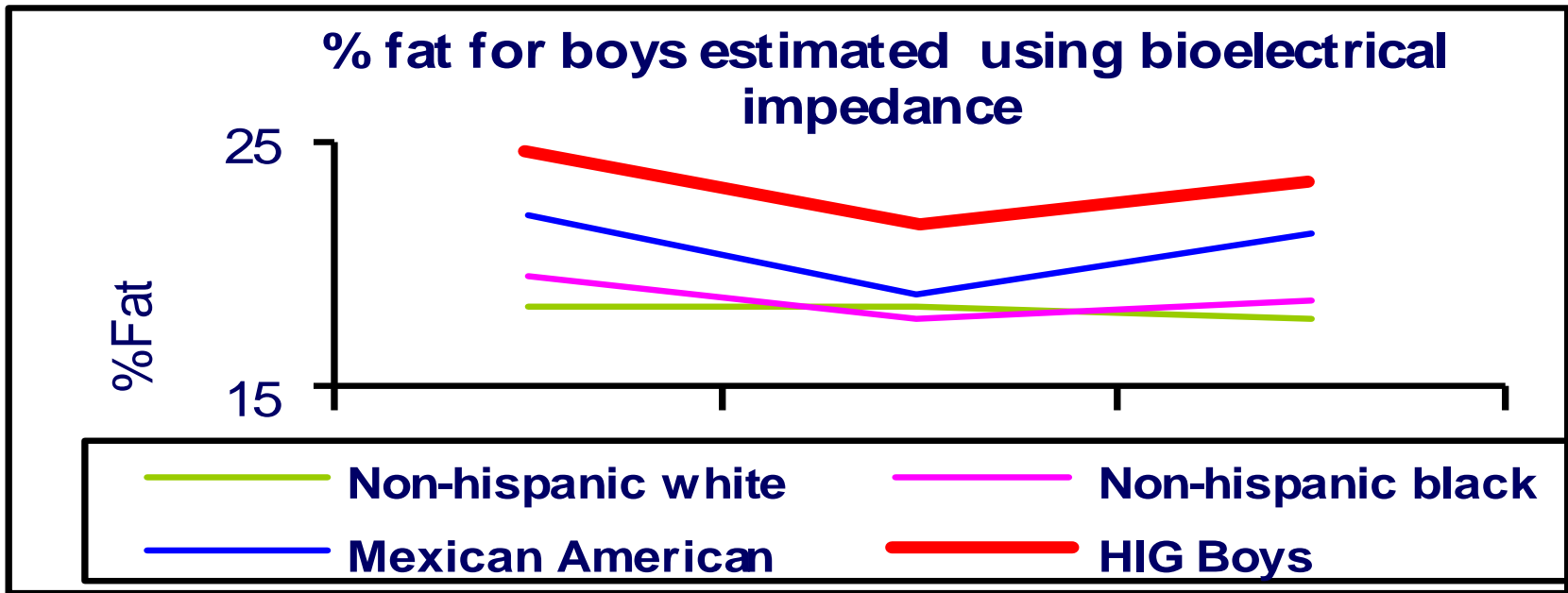


Source: NNMB

Over two decades there was very little increase in height but some increase in weight.

As a result there has been some rise in BMI in the 0-16 year age group

This is mainly due to increase in body fat



Over years there has been an increase in adiposity in school age children both in urban and rural areas

Data from Indian adolescents from urban high income group using bioelectrical impedance analysis have shown that they have high fat.

Comparison of data on % fat in Delhi urban high income group adolescent boys with Non-Hispanic white, Non-Hispanic black and Mexican Americans showed that % body fat was highest in Indian boys.

Adiposity in adolescents is associated with adiposity in adults.

**DIMENSIONS AND DETERMINANTS OF  
DUAL NUTRITION BURDEN IN ADULTS**

# ENERGY REQUIREMENT OF ADULTS

## MALE

## FEMALE

Body Wt Kg.	BMR	PAL		Body Wt Kg.	BMR	PAL	
		1.53	1.4			1.53	1.4
45	1298	1986	1817	40	1031	1577	1443
50	1370	2096	1918	45	1101	1685	1541
55	1443	2208	2020	50	1171	1792	1639
60	1515	2318	2121	55	1241	1899	1737
65	1588	2430	2223	60	1311	2006	1835
70	1660	2540	2324	65	1318	2113	1933

Energy requirements depend on body weight.

Indian men and women are short; average weight of Indian woman is 46 Kg and that of men is 51 kg.

Energy requirements of sedentary Indians are low

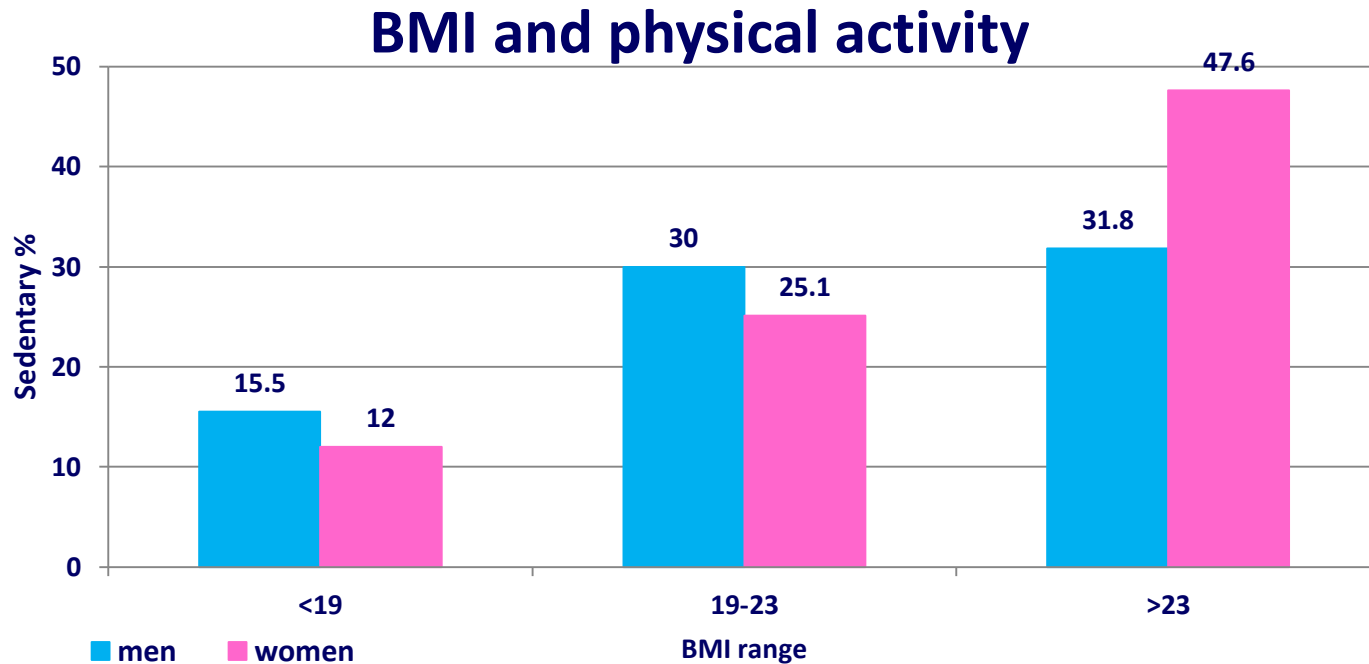
# CHANGES IN BODY WEIGHT IN HIG

Groups	Weight (Kg)	BMI	Energy Intake	Energy expenditure
30-39	59	24.8	2134	2056
40-49	64	26.4	2264	2191
50-59	69	28.6	2195	2146

Source: Wasuja and Siddhu

- Even in women from high income group, the energy intake is not high
- However energy expenditure is lower than intake by about 75-100Kcal/day
- This positive energy balance leads to a progressive increase in body weight over decades
- This is the major factor responsible for increase in obesity and increased risk of CVD

# PHYSICAL ACTIVITY AND BMI



**With mechanisation of household chores over-nutrition in women is becoming common.**

**With low occupation related and discretionary physical activity, over-nutrition rates in women and men are increasing. Sedentary men and women have higher BMI.**

# PHYSICAL ACTIVITY STATUS OF MEN & WOMEN IN RURAL INDIA

Activity status	Men		Women		Total	
	No	%	No	%	No	%
Sedentary	1349	33.3	2765	62.7	4114	48.6
Moderate	2650	65.5	1632	37.0	4282	50.6
Heavy	48	1.2	14	0.3	62	0.8

Source: Human nutrient requirements and RDA for Indians ICMR 2010

Over the last two decades, there has been progressive increase in mechanization of transport, occupational and household activities. Consequently there has been reduction in physical activity and energy needs in rural areas even among the poor.

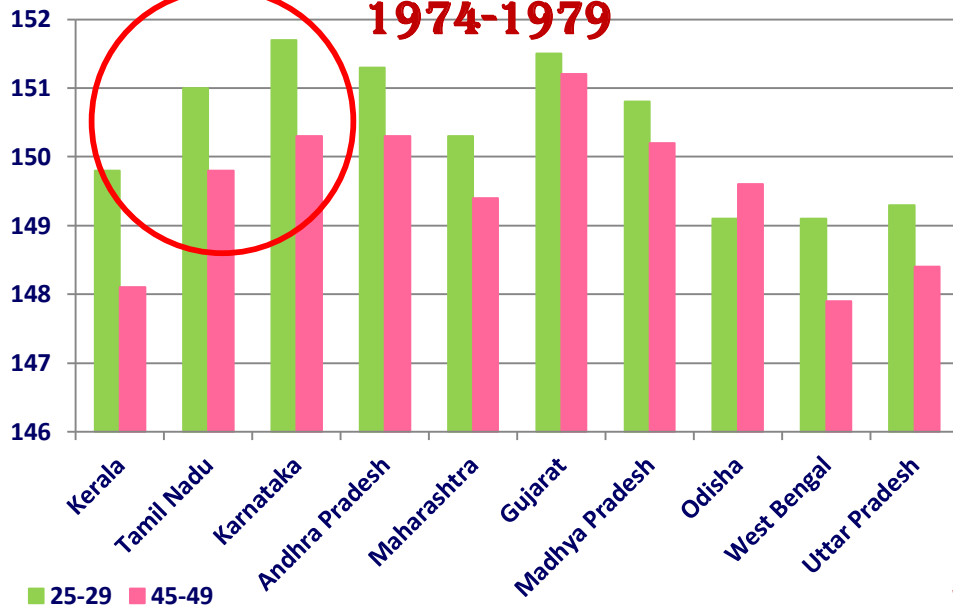
Moderate physical activity is essential for good health.

Efforts are underway to build awareness on importance of physical activity & create conducive environment to increase discretionary physical activity among all segments of population.



## HEIGHT OF WOMEN NNMB SURVEY

1974-1979



The mean height of Indian women was only 150 cms - they are 12-14 cm shorter than NCHS women

There were 1-2 cm difference in mean height between states (eg UP. WB vs Karnataka)

Women in their twenties in 1970s were taller than their counterparts in 1950s by 1-2 cms

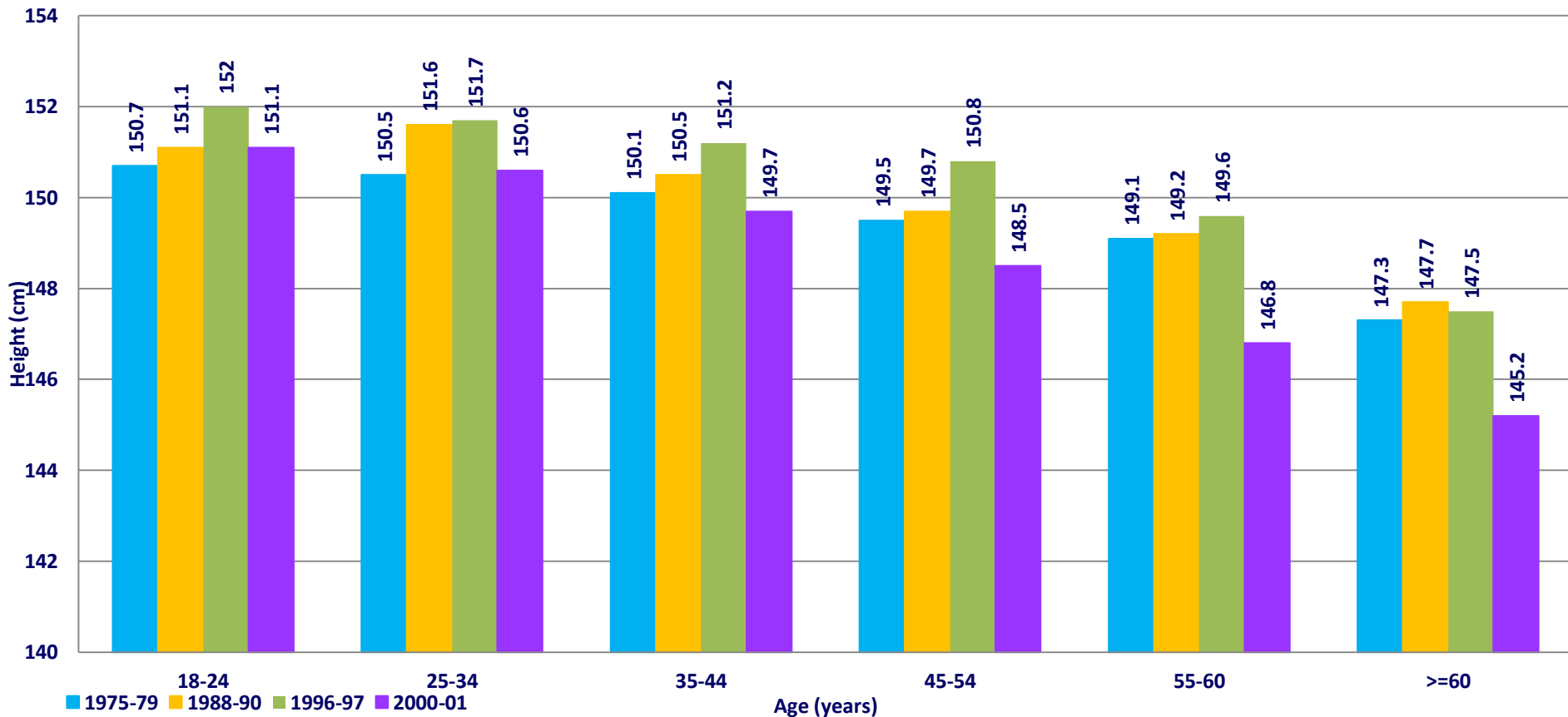
## NUTRITIONAL STATUS OF WOMEN IN '70S

	Ht	Wt	BMI
Rural (NNMB)	150.6	42.4	18.7
Urban			
H I G	154.9	52.2	21.8
MI G	151.8	49.2	21.4
LIG	150.4	44.8	19.8
Indl. workers	150.7	44.8	19.7
Slum	150	42.2	18.8

Women from HIG group were taller than LIG by 4 cm

Rural women, urban LIG and urban slum dwellers weighed 10kg less than the high income urban women

# TIME TREND IN MEAN HEIGHT IN WOMEN (NNMB)

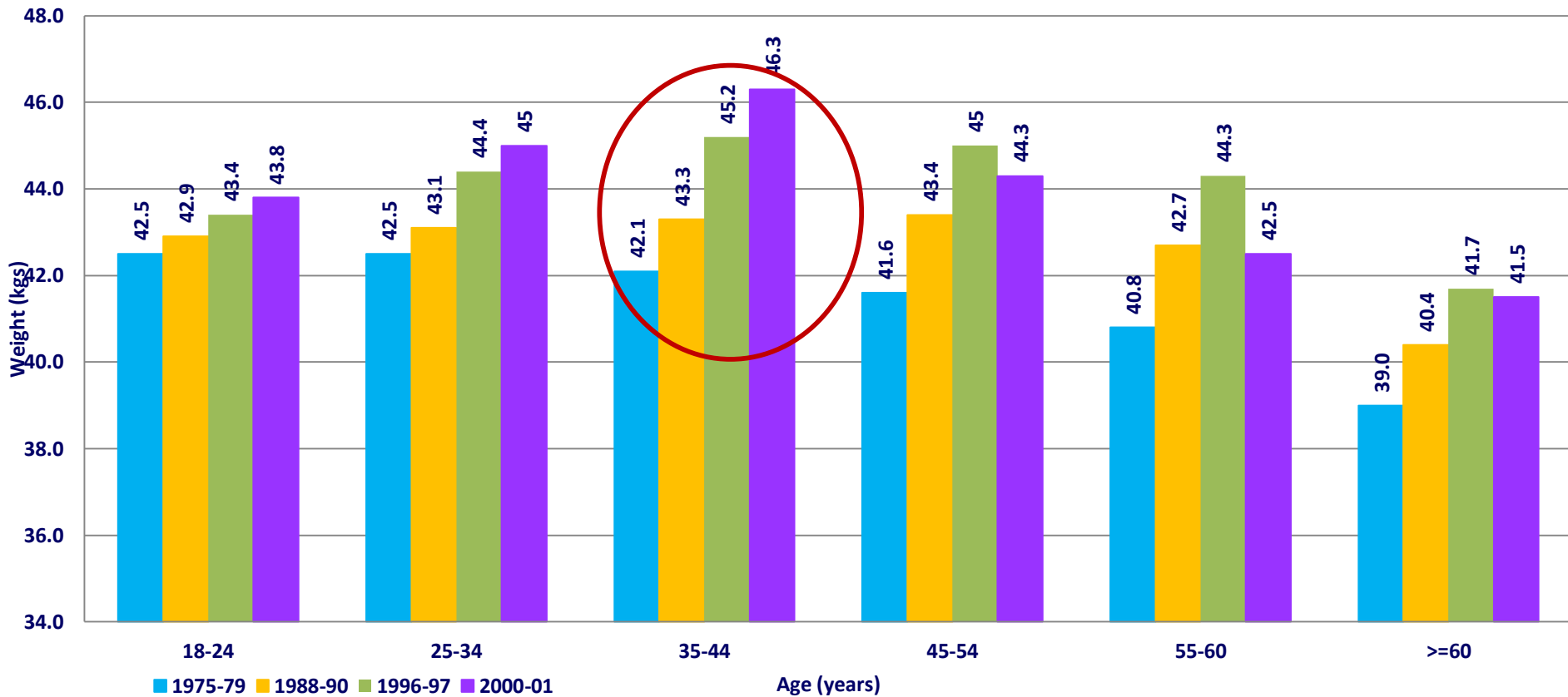


**Increase in mean height in Indian women over three decades is less than 3 cms**

**Inter income group and interstate differences in height in Indian women is 5-6 cm.**

**INDIAN WOMEN ARE SHORTER (151) THAN NCHS WOMEN (164) BY 13 CMS  
THIS GAP CANNOT BE RAPIDLY BRIDGED**

# TIME TRENDS IN MEAN WEIGHT IN WOMEN (NNMB)



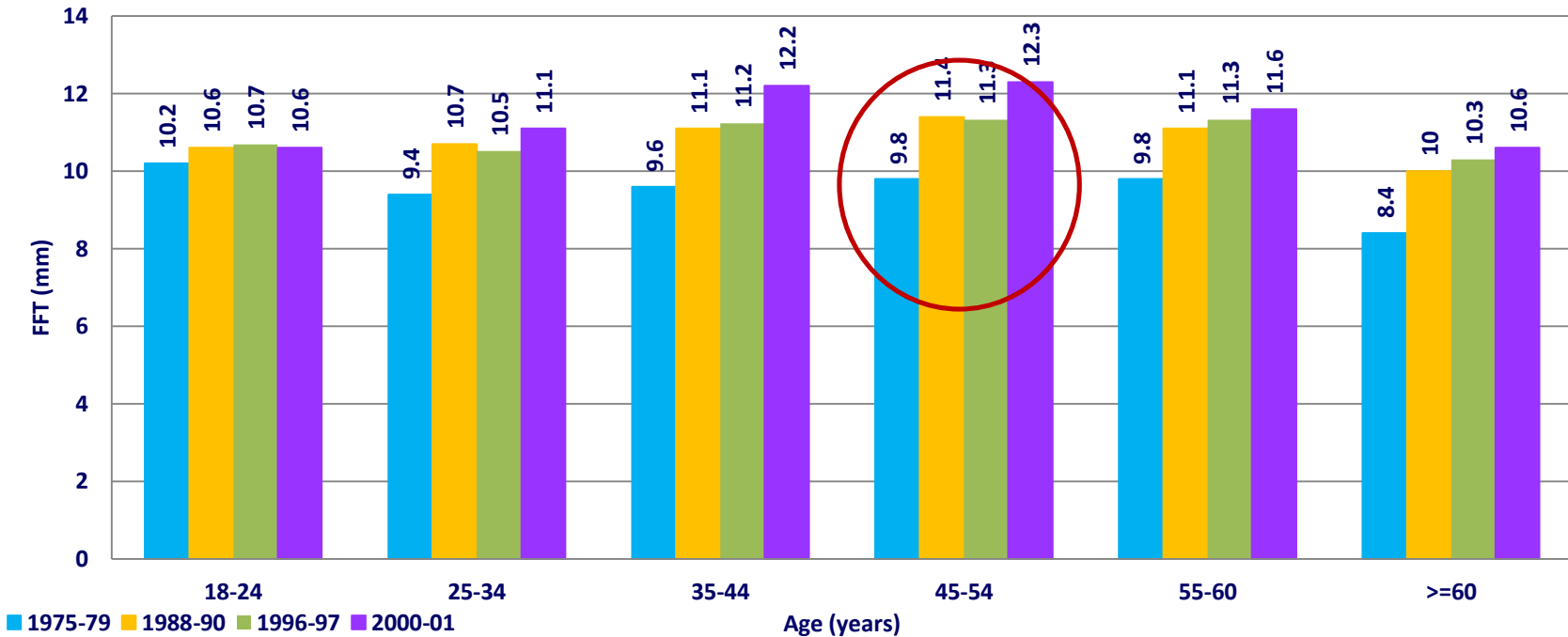
Mean weight is lowest in the <25 yr group.

Over years there has been increase in mean weight in women (2 kg in <25 and >4kg in 35-45 age group).

Inter-income group and inter-state differences in wt is about 5 - 12 kg

**INDIAN WOMEN ARE LIGHTER (42KG) THAN NCHS WOMEN BY (57KG) 15 KG THIS IS PARTLY DUE TO LOWER HEIGHT AND PARTLY DUE TO LOWER BMI**

# TIME TRENDS IN FFT IN WOMEN (NNMB)



Research studies have shown that for the same BMI Indians have greater adiposity and lower muscle mass.

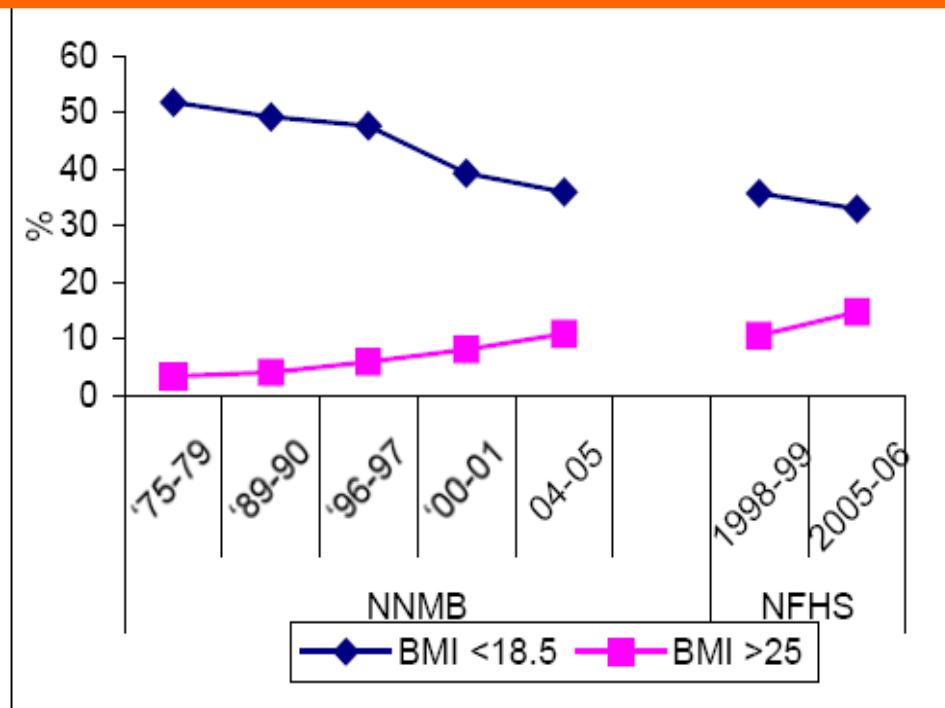
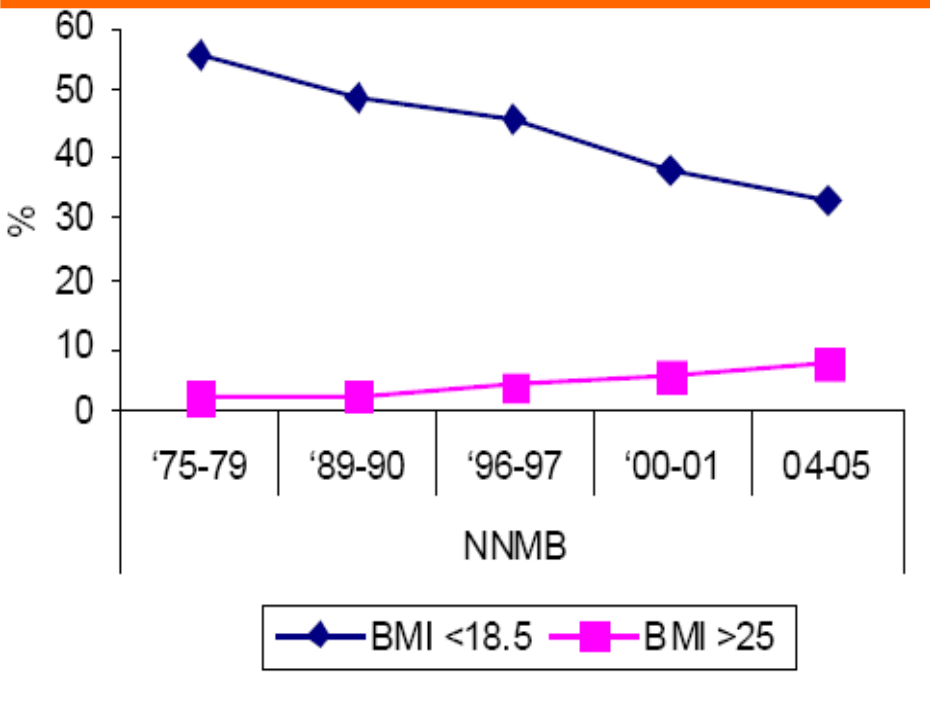
There has been an increase in mean FFT in Indian women in the last four decades

It is lowest (<0.5mm) in young women and highest in 45 - 54 age group (>2.5mm)

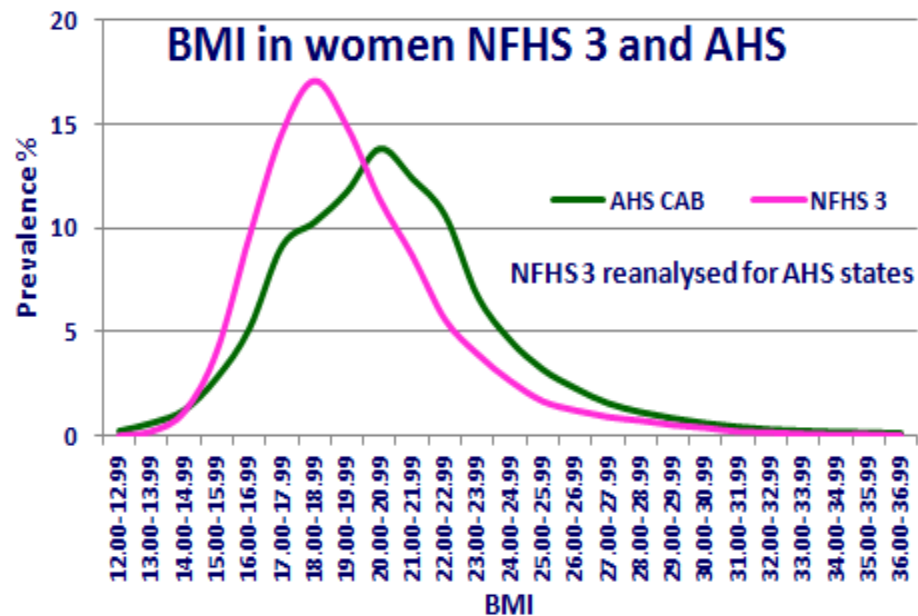
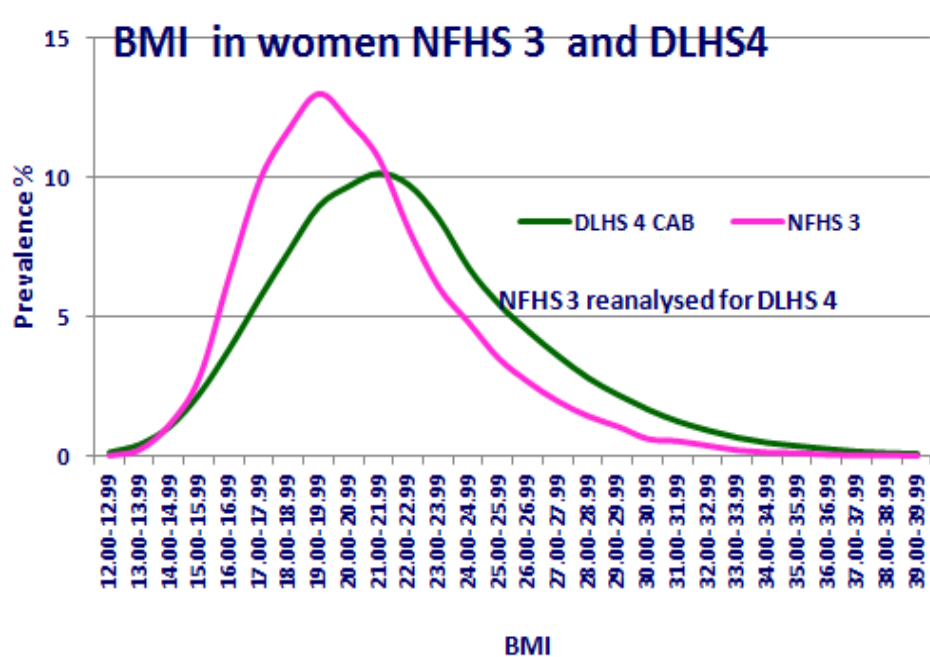
Inter-income group and inter-state differences is about 2 mm

Adiposity is the major factor responsible for the rising non-communicable disease burden.

# TIME TRENDS IN NUTRITIONAL STATUS OF MEN AND WOMEN



- Data from National Nutritional Monitoring Bureau indicate that**
- 🌐 there has been a slow but steady decline in the prevalence of under-nutrition in adults - perhaps due to lower physical activity and better health care
  - 🌐 since nineties there has been a slow but progressive increase in over-nutrition - due to unchanged dietary intake and lower physical activity



Over the last few decades there has been a steep reduction in energy expenditure due to low physical activity.

There has been some reduction in energy intake in high income groups but the reduction is not commensurate with the reduction in physical activity.

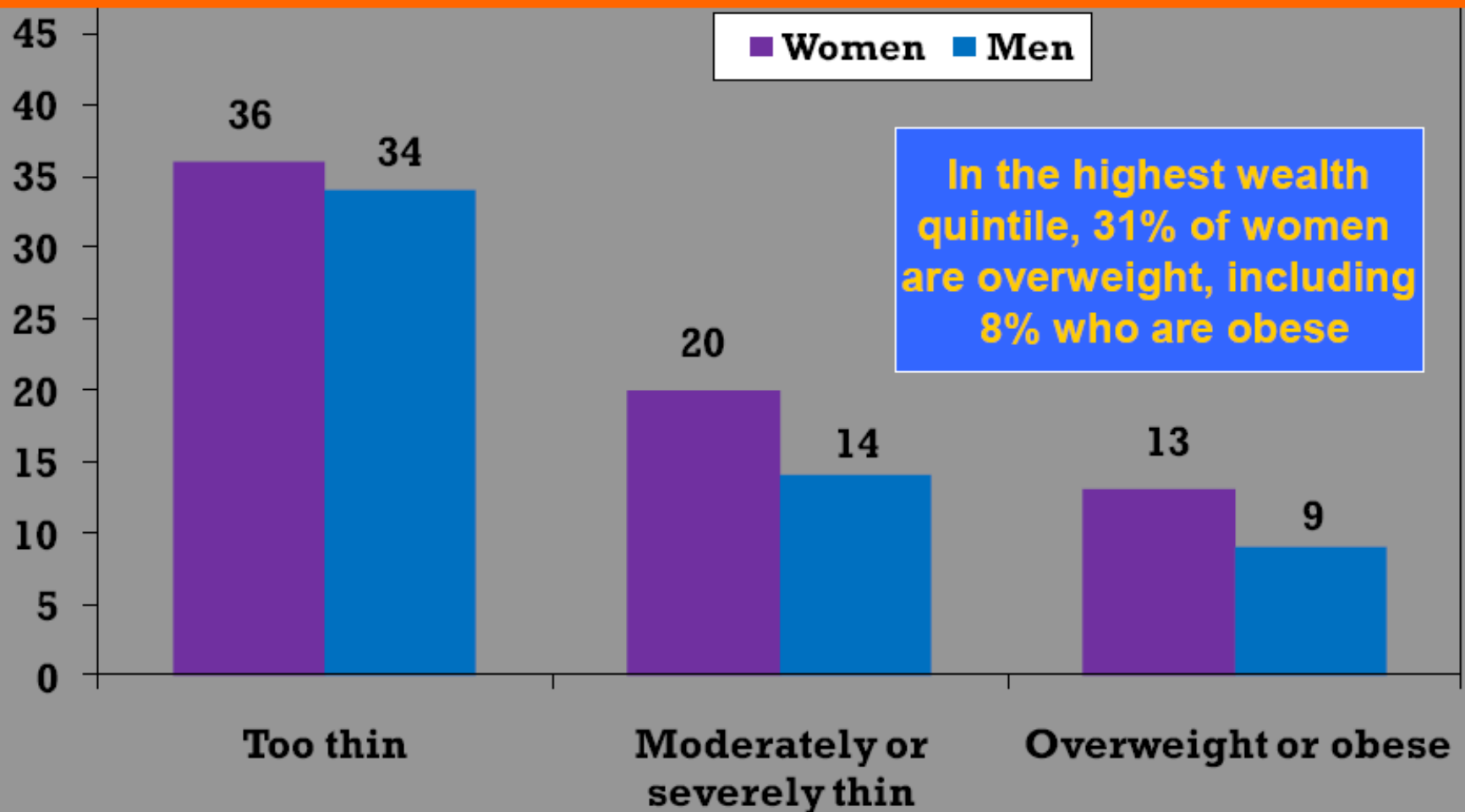
As a result there has been a shift to the right in the frequency distribution of BMI of the entire population.

Benefit has been the reduction in under-nutrition especially severe forms

Problem is the rise in over-nutrition rates

Both adequate food intake and physical activity is essential for optimal nutrition and health

# DUAL NUTRITION BURDEN IN ADULTS

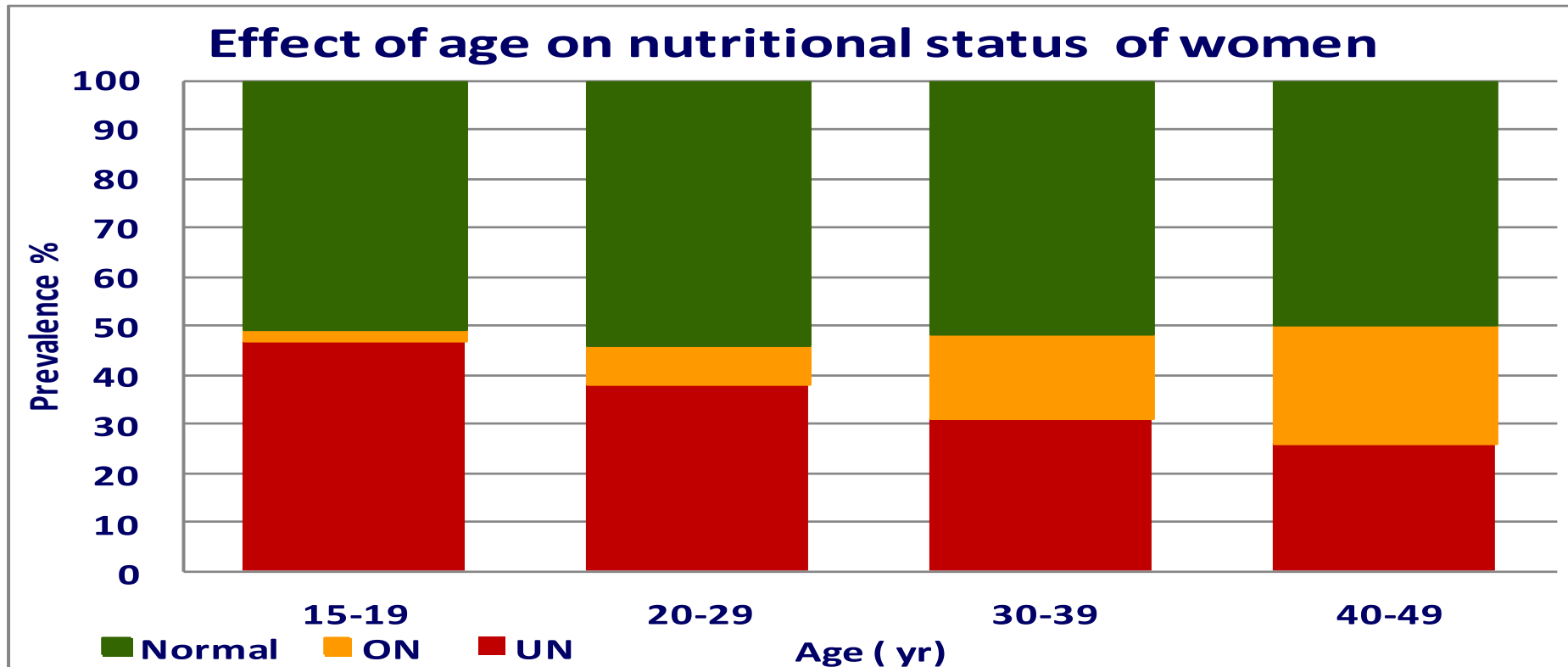


NFHS-3, India, 2005-06

Dual nutrition burden is seen both in men and women

Prevalence of both under and over-nutrition is higher in women as compared to men

# BMI IN RELATION TO AGE IN WOMEN (NFHS 3)

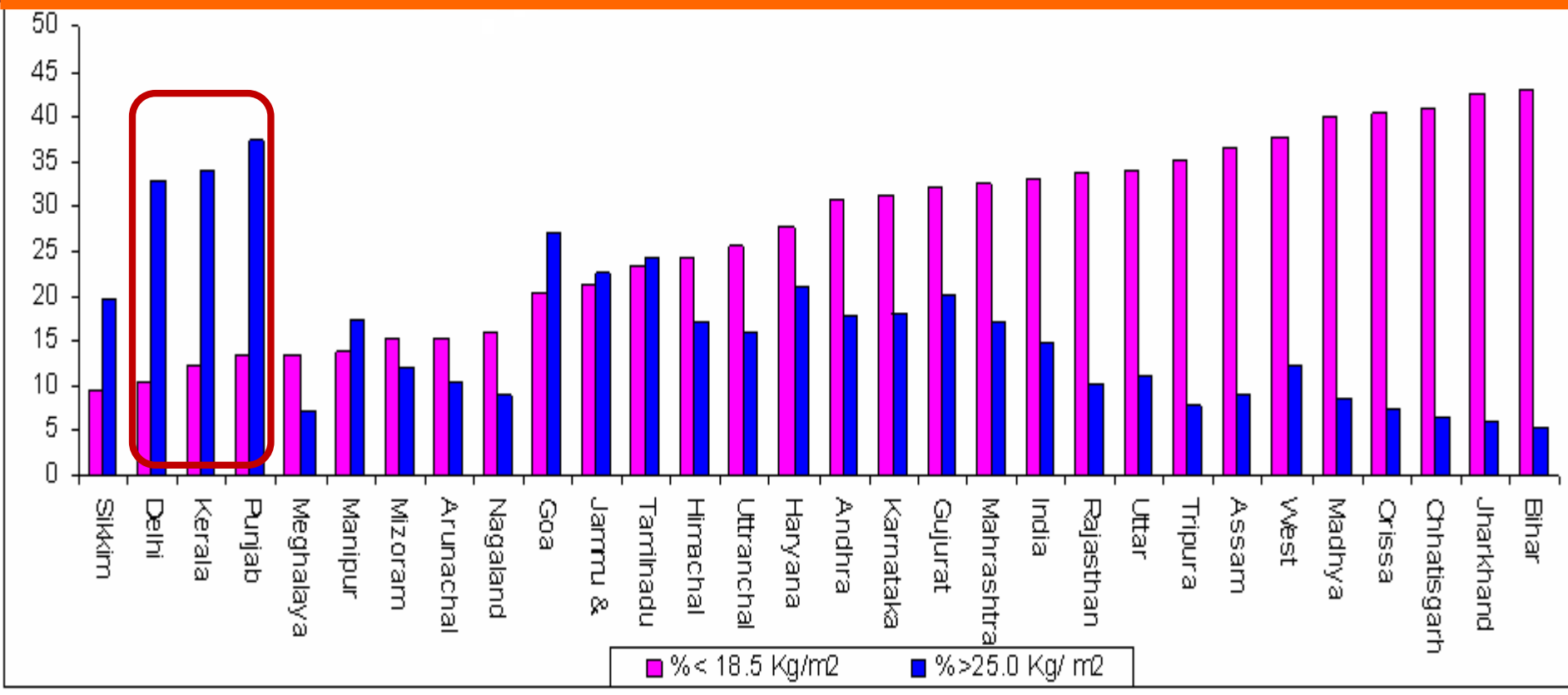


Among poorer segments of population, under-nutrition rates are high in young women - the mother-child dyad face health risks associated with under-nutrition.

Among older women over-nutrition rates are high - they face higher NCD risk.



# OVER-NUTRITION RATES IN DELHI 2005



- There are huge inter-state differences in prevalence of both under and over-nutrition.
- Prevalence of over-nutrition is high in Delhi, Punjab and Kerala. These states face high NCD risk.
- These states also have higher longevity; there is a need to improve nutrition and health care for elderly

**TO SUM UP**

# **DIMENSIONS OF DUAL NUTRITION BURDEN IN CHILDREN**

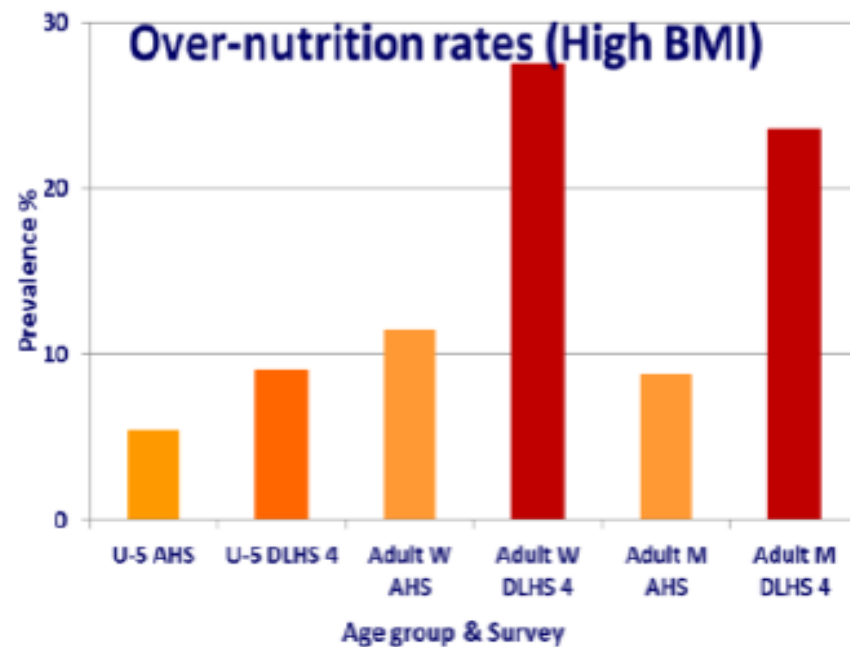
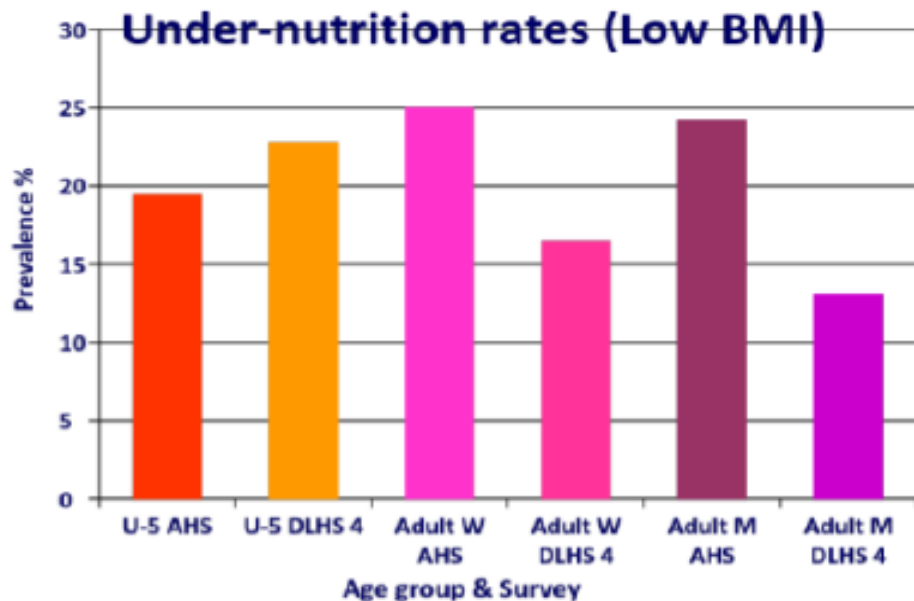
**Over years there has been a steep decline in severe under-nutrition but even now severe under-nutrition with life-threatening complications which require hospitalisation are seen in young children**

**Moderate under-nutrition rates remain high - there is a need to focus on prevention, early detection and effective management of moderate under-nutrition in all age groups.**

**In the last two decades there has been a steady and progressive increase in over-nutrition and associated non-communicable diseases in all age groups.**

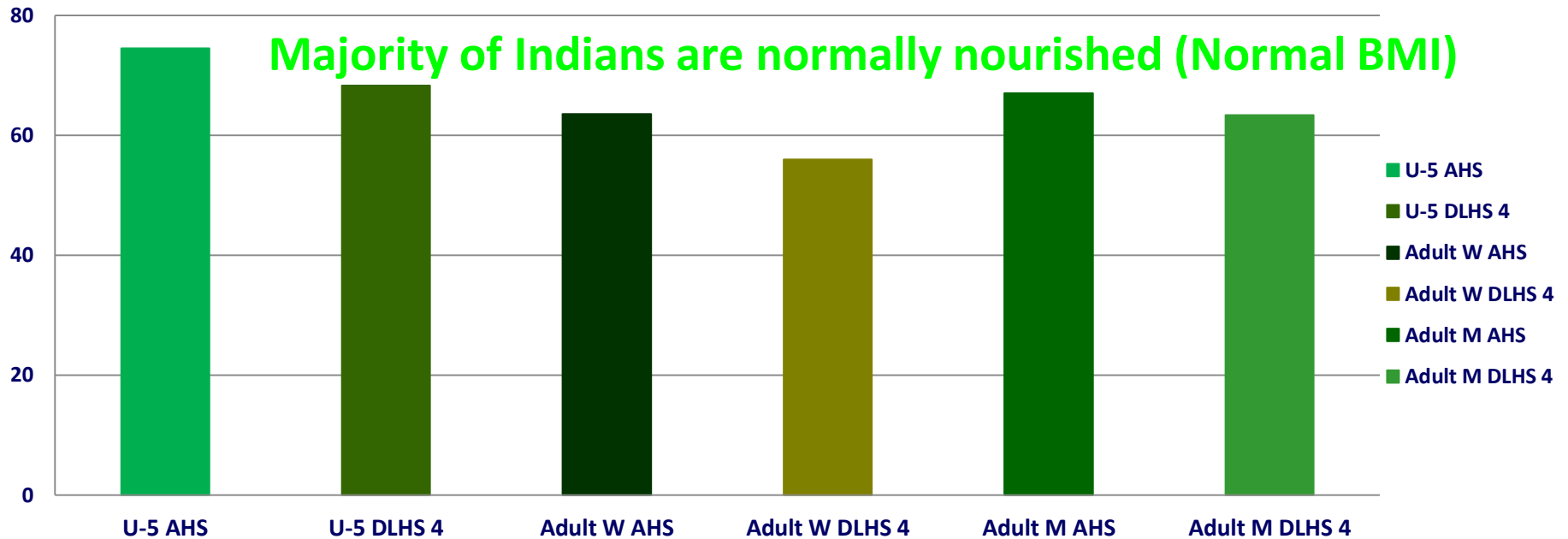
**This trend has to be arrested and later reversed**

# USE OF BMI FOR ASSESSING NUTRITIONAL STATUS IN ALL AGE GROUPS



Use of BMI-for-age for assessment of nutritional status across age groups shows that both wasting and adiposity are lowest in under-five children. Interventions in this age group could readily correct these; correction at this age group will have lifelong benefits in terms of nutrition and health status. Both under and over-nutrition rates increase with increasing age. AHS states (central India and east) have high under-nutrition rates and low over-nutrition rates DLHS4 states (south and west) have low under-nutrition rates and high over-nutrition rates

# USE OF BMI FOR ASSESSING NUTRITIONAL STATUS IN ALL AGE GROUPS



Nearly 80% of Indian children are normally nourished.

We have programmes to prevent, detect and manage under- and over-nutrition in pre-school and school age children.

Majority of Indians adults are normally nourished

Nutrition and health professionals and aware population can strive to prevent and combat under-nutrition and to prevent the projected rise in over-nutrition through effective implementation of existing programmes.

This effort will prevent projected rise in NCD and to add years of normal healthy good quality life.

# PROGRAMMES FOR COMBATING DUAL NUTRITION BURDEN

## ASSESSMENT OF NUTRITIONAL STATUS

Screen by anthropometry to detect under- and over-nutrition and adiposity

Assess dietary intake and physical activity

## EFFECTIVE MANAGEMENT OF DUAL NUTRITION AND HEALTH BURDEN

Provide appropriate nutrition education and care, monitor improvement

Access health problems provide appropriate and affordable health care

Interventions span the spectrum from public health measures aimed at reducing the risk of under- and over-nutrition in entire population, screening of vulnerable segments for early detection and effective care for individuals with nutrition and related health problems



THANK YOU